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THE ENGINEER

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PUBLIC APPOINTMENTS

UNIVERSITY OF CAPE TOWN SOUTH AFRICA

LECTURESHIP IN ELECTRICAL ENGINEERING

Applications are invited for the above position. The Lecturer's main qualifications may be either in the power field with experience in electrical machines or in the electronics or communications field.

The salary scale is £1,340×60—£1,760 per annum.

Applications should state age, experience, qualifications and research work completed or in progress and should give the names of two referees whom the University may consult.

Two copies of the application and testimonials should reach the Secretary, Association of Universities of the British Commonwealth, 36, Gordon Square, London, W.C.1. (from whom memoranda giving the general conditions of appointment and further information about the work of the department should be obtained) not later than the 17th August 1959. An additional copy should be sent direct by airmail to the Registrar, University of Cape Town, Private Bag, Rondebosch, Cape Town, South Africa by the same date.

The University reserves the right to appoint a person other than one of the applicants or to make no appointment. E6897

UNIVERSITY OF SYDNEY

LECTURESHIP IN AERONAUTICAL ENGINEERING

Applications are invited for the above position. The successful applicant will be required to lecture and to undertake research, in the subject of aerodynamics.

The salary for a Lecturer is within the scale £A1,500×90—£2,100 per annum, plus cost of living adjustment and will be subject to deductions under the State Superannuation Act. The commencing salary will be fixed according to the qualifications and experience of the successful applicant.

Under the Staff Members' Housing Scheme in cases approved by the University and its Bankers, married men may be assisted by loans to purchase a house.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

Applications close, in Australia and London, on 22nd August, 1959. E6898

UNIVERSITY OF EDINBURGH

DEPARTMENT OF ENGINEERING ASSISTANT

Applications are invited for the post of Assistant in the Department of Engineering. Salary Scale £700×£50 to £850 per annum, together with superannuation benefit and family allowance where applicable. Candidates are normally expected to possess an honours degree in Mechanical or Civil Engineering. The successful candidate will be encouraged to research with a view to obtaining a higher degree.

The successful Candidate will be expected to take up duty on 1st October, 1959.

Further information may be obtained from the undersigned, with whom applications, giving the names of two referees, should be lodged as soon as possible.

CHARLES H. STEWART
Secretary to the University.
E6913

UNIVERSITY OF BIRMINGHAM

DEPARTMENT OF MECHANICAL ENGINEERING

Applications are invited for the following posts for October 1st, 1959, or as soon as possible thereafter:—

(1) ELECTRONIC ENGINEER AS LECTURER. Primarily required to teach servo-mechanisms and systems analysis and to take charge of the Servo-mechanisms and Analogue Computor Laboratory. Experience in control engineering and/or analogue compution essential.

(2) MECHANICAL ENGINEER AS LECTURER. Primarily required to teach Dynamics. Research experience in vibration or shock insulation on servo-mechanisms or metal cutting desirable.

Successful applicants for the above posts will be expected to make full use of the research facilities of the Department, either by contributing to the existing research programmes or by developing their own research interests.

Qualifications:—Honours degree with research and/or teaching experience.

Salary: within the range £900×50 to £1,350. £1,350×75 to £1,650.

Applications (three copies) with the names of three referees, should be sent by 31 August, 1959, to the Deputy Registrar, The University, Birmingham, 15, from whom further particulars can be obtained. E6901

FYLDE WATER BOARD

ASSISTANT ENGINEER

Assistant Engineer—salary scale APT IV (£1,065—£1,220). Applicants must be Corporate Members of the Institution of Civil Engineers, and whilst waterworks experience is desirable it is not essential.

The Board has an extensive capital works programme in hand amounting to £2,500,000 during the next five years.

Further details of work in hand, and application forms may be obtained from Engineer to the Board, Sefton Street, Blackpool. Last date for applications 1st August, 1959. E6908

PUBLIC APPOINTMENTS

PORT OF GREENOCK ASSISTANT GENERAL MANAGER

Applications are invited for the post of Assistant General Manager to the Greenock Harbour Trust. The appointment will run until the retirement of the present General Manager and Engineer in November 1960 when the appointee will be considered for promotion as may then be decided. Candidates should already have administrative experience, and engineering qualifications, while not essential, may be of advantage. The immediate salary offered is not less than £1500 according to qualifications; a contributory superannuation scheme is in operation in conjunction with the Local Authority. Occupancy of a house is available for a General Manager.

Ten copies of applications with full particulars of age, qualifications and experience and the names and addresses of not less than two referees should be forwarded before 31st August 1959 in a cover marked "Assistant General Manager" to the Chairman, Greenock Harbour Trust, Customhouse Quay, Greenock. E.6858.

BOROUGH OF TORQUAY

CORPORATION WATERWORKS

APPOINTMENT OF DEPUTY WATER ENGINEER

Applications are invited for the above appointment, at a commencing salary within Grade A.P.T.V. (£1,220—£1,375 p.a.) according to qualifications and experience. Applicants must be Corporate Members of the Institution of Civil Engineers and preferably Corporate Members of the Institution of Water Engineers, with experience in the design and construction of waterworks and administration of a water undertaking.

Further particulars and form of application may be obtained from the Water Engineer, Municipal Chambers, Castle Circus, Torquay.

Applications on the prescribed form, together with copies of two recent testimonials and the name of one referee, should be received by the undersigned in sealed envelopes endorsed "Deputy Water Engineer" not later than Monday, 10th August, 1959.

Canvassing will be a disqualification and applicants must disclose in writing if they are related to any members or senior officers of the Council.

T. ELVED WILLIAMS,
Town Clerk.
Town Hall, Torquay. E.6889

WEST MIDLANDS GAS BOARD

NORTH STAFFORDSHIRE DIVISION

VACANCY FOR ASSISTANCE MAINTENANCE AND CONSTRUCTIONAL ENGINEER

STOKE ON TRENT

Candidates should have served an apprenticeship in Mechanical Engineering, have had experience in a drawing office and in the maintenance of mechanical plant and also be capable of preparing estimates

The person appointed will be responsible to the Maintenance and Constructional Engineer for plant maintenance and new constructional and building work, the control of skilled maintenance staff of all types, and the supervision of contractors' personnel.

Preference will be given to candidates who hold an appropriate mechanical engineer qualification.

The salary or the appointment, which is pensionable and subject to medical examination, will be within A.P.T Grade 9 (£827—£927 per annum) of the National Salary Scales for Gas Staffs.

Applications, stating age, education and experience, together with the names of two referees, should be addressed to Mr. L. W. Johnson, Divisional General Manager, West Midlands Gas Board, Etruscan Street, Etruria, Stoke-on-Trent.

J. SWAN
Secretary to the Board
E6894

DEPARTMENT OF MAIN ROADS

NEW SOUTH WALES, AUSTRALIA

CIVIL ENGINEERS

Applications are invited from graduates (or undergraduates in their final year) in Civil Engineering of a recognised British or Irish University for appointment to the staff of the Department of Main Roads, New South Wales, the State Road Authority for construction of roads and bridges.

On appointment, applicants may be engaged at the Department's Head Office, Sydney, on the design of reinforced concrete and steel bridges, or on main road construction and maintenance either in the Metropolitan Area or the country.

Commencing salary according to qualifications and experience will be within the range £A1185 to £A1410 per annum, with annual progression, subject to technical competence to £A2095 per annum Appointees will be eligible to contribute to the State Superannuation Fund after six months.

Appointee's full fare from England to Australia will be met by the Department, subject to a three year's service guarantee bond being completed. Appointment will be subject to passing a medical examination and preference will be given to applicants not more than 30 years of age.

Applications should be made on forms obtainable from the Agent General for New South Wales, 56 Strand, London, W.C.2. E6907

PUBLIC APPOINTMENTS

GOVERNMENT OF TANGANYIKA

EDUCATION OFFICERS

(Technical Training) preferably between 25 and 40, required to teach (a) Civil Engineering and allied subjects, (b) Building Construction and Drawing and elementary Quantity Surveying and allied subjects. Qualifications for (a) Degree in Engineering or A.M.I.C.E., (b) Corporate Membership of (1) Royal Institute of British Architects or (2) Incorporated Association of Architects and Surveyors or (3) Associate of Institute of Builders. Either a teachers certificate or minimum of two years' teaching experience essential for both posts. Posts on contract/resettlement grant terms. Home pension rights can be preserved. Salary at appropriate points in scale £879—£1,617 or £939—£1,863 inclusive. Quarters at low rental. Free passages and medical attendance. Outfit and Education allowances. Tour of service 30-36 months. Low Income Tax. Generous home leave. Further particulars and application forms from the Director of Recruitment, Colonial Office, London, S.W.1. quoting BCD 114/8/05 (b). E.6899

COUNTY BOROUGH OF PRESTON

RIBBLE NAVIGATION UNDERTAKING

ENGINEER

Applications are invited for the post of Engineer to the Preston Corporation Ribble Navigation Undertaking at a salary of £1,990 rising by four annual increments of £60 and one of £50 to £2,280 per annum.

Applicants must be Corporate Members of the Institution of Civil Engineers, have a wide knowledge of the design and construction of major new works, maintenance works, and extensive estuarial and dredging experience, and have ability to administer and control all engineering staff, including professional staff.

The appointment is superannuable and terminable by three months' notice on either side.

Applications, stating age, qualifications, experience and details of present and past appointments, together with the names of three referees, should be received by the undersigned not later than Saturday, the 1st August, 1959.

W. E. E. LOCKLEY,
Town Clerk.
Municipal Building, PRESTON. E6890

TENDERS

KINGDOM OF THAILAND

ROYAL IRRIGATION DEPARTMENT

BANGKOK, THAILAND

INVITATION FOR BIDS—No. YS-2-8

The Royal Irrigation Department of the Kingdom of Thailand hereby invites sealed written bids for furnishing and delivering the following goods, equipment, and materials either fob Contractor's Dam and Power Plant, Yanhee Multipurpose Project, Kingdom of Thailand, in accordance with the Contract Documents, Invitation for Bids—No. YS-2-8 for:

Design, manufacture, and supervision of installation of (3) Fixed Wheel Gates for penstock intakes, each with hoist, controls and appurtenances, and (8) complete sets of gate frames and guides, all as required for field assembly and installation. The gates are each nominally 3·70 meters wide and 5.77 meters high, and will be operated under a maximum head of 60 meters.

Bids will be issued in July 1959 and will be opened in October 1959. Copies of Contract Documents, Invitation for Bids—No. YS-2-8 may be obtained by qualified Bidders on written request on Bidders letterhead, addressed to:

Royal Irrigation Department
Attention: Thai Liaison Engineer
c/o Engineering Consultants, Inc.
1940 West Mississippi Avenue
Denver 23, Colorado

Each request must be accompanied by a cheque or money order, payable to the Royal Irrigation Department, in the amount of U.S. £10.00 for each copy of the Contract Documents requested. The remittance is nonreturnable.

M. L. Xujati Kambhu
Director General
Royal Irrigation Department
Kingdom of Thailand
Bangkok, Thailand

E6909

INDIA STORE DEPARTMENT

The Director General, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3. invites tenders for the supply of:—

Tender Ref. No. 17643/HSK/HAL

"WIRE ROPE ELECTRICAL HOISTS WITH TRAVELLING CARRIAGE, 5 CWT. to 2 TON CAPACITIES".

The tender forms with schedules and specifications which are returnable on 20.8.1959 may be obtained from the above office (C.D.N. Branch) on payment of a fee of ten shillings (not refundable) for each tender. The applications for tenders should clearly state the above reference number. E6906

TENDERS

KINGDOM OF THAILAND

ROYAL IRRIGATION DEPARTMENT

BANGKOK, THAILAND

INVITATION FOR BIDS—No. YS-2-12

The Royal Irrigation Department of the Kingdom of Thailand hereby invites sealed written bids for furnishing and delivering the following goods, equipment, and materials either fob Contractor's Dam and Power Plant, Yanhee Multipurpose Project, Kingdom of Thailand, in accordance with the Contract Documents, Invitation for Bids—No. YS-2-12, for:

Furnishing one lot of 250 tons of hot rolled steel bars and shapes and 3,300 square feet of welded type floor grating.

Bids will be issued in July 1959 and will be opened in September 1959. Copies of Contract Documents, Invitation for Bids—No. YS-2-12 may be obtained by qualified Bidders on written request on Bidder's letterhead, addressed to:

Royal Irrigation Department
Attention: Thai Liaison Engineer
c/o Engineering Consultants, Inc.
1940 West Mississippi Avenue
Denver 23, Colorado

Each request must be accompanied by a cheque or money order, payable to the Royal Irrigation Department, in the amount of U.S. $5,00 for each copy of the Contract Documents requested The remittance is nonreturnable.

M.L. Xujati Kambhu
Director General
Royal Irrigation Department
Kingdom of Thailand
Bangkok, Thailand

E6910

CITY OF LEEDS

WATERWORKS DEPARTMENT

Tenders are invited for the Construction, completion and maintenance of a rapid gravity filteration works and pumping station of 15 million gallons per day capacity, together with a 5 million gallons clear water reservoir and other ancillary works at Eccup Reservoir in the City of Leeds.

Contract documents and General Arrangement and Typical Detail Drawings may be collected from the undersigned upon payment of a deposit of Ten Guineas which will be refunded following the receipt of a bona fide Tender and the return of all Contract documents.

Arrangements may be made for detail drawings to be inspected on application to the Waterworks Department, Room 14, Civic Hall, Leeds, 1.

Tenders, duly completed, must be enclosed in plain sealed covers addressed to the Town Clerk and endorsed "Tender for Eccup Filteration Works" and be delivered at the Town Clerk's Office, Room 57, Civic Hall, Leeds 1, not later than 12 noon on MONDAY, the 14th SEPTEMBER, 1959. The corporation does not bind itself to accept the lowest or any Tender.

KENNETH L. FORSTER, M.I.C.E.
General Manager & Engineer
Waterworks Department,
Civic Hall,
Leeds, 1. E6902

SCOTTISH HOME DEPARTMENT

GLASGOW—GREENOCK—MONKTON TRUNK ROAD A.78

KILWINNING BYPASS

The Secretary of State invites Tenders for the above scheme which involves he construction of approximately two miles of trunk road to a dual carriageway layout, reinforced concrete bridges over the River Garnock and the Kilwinning—Stevenston Railway and ancillary works. Drawings of the proposed work, are available for inspection at the offices of the Consulting Engineers, Messrs. Crouch and Hogg, 18 Woodside Crescent, Charing Cross, Glasgow, C.3.

Contract Documents are obtainable from the Consulting Engineers at the above address upon payment of a deposit of £15 by cheque or draft made payable to order of the Queen's and Lord Treasurer's Remembrancer. The deposit will be returned if a bona fide tender is submitted and not subsequently withdrawn.

Tenders on the official form, which must be received before 4 p.m. on Monday, 31st August 1959, should be sent in a sealed registered envelope marked "Tender for Kilwinning Byepass" addressed to the Secretary, Scottish Home Department, Broomhouse Drive, Saughton, Edinburgh, 11.

The Secretary of State does not bind himself to accept the lowest or any tender. E6895

EDUCATIONAL

THE UNIVERSITY OF MANCHESTER

ADVANCED STUDY AND RESEARCH IN NUCLEAR ENGINEERING

Facilities for advanced study and research in Nuclear Engineering will be available from October 1959 in the Department of Engineering in the Faculty of Science, consequent upon the appointment of Mr. W. B. Hall to the Chair of Nuclear Engineering. Applications are invited from candidates who wish to proceed to a higher degree or to the Diploma for Advanced Studies in Science. All applications and enquiries should be addressed to the Registrar, the University, Manchester 13. E6918

EDUCATIONAL

A.M.I.MECH.E., B.Sc., City and Guilds, &c. Guarantee Postal Courses for all Exams. and Technical Divisions from Elementary to Degree standard including Automation Techniques. Approximately 95 per cent successes. 148-page prospectus free on request.—B.I.E.T. (Dept. 22), 29, Wright's Lane, London, W.8. E114 E

ELECTRONICS, covering practical and theoretical aspects, basic principles, industrial applications, electronic apparatus, &c. Guaranteed coaching for Fit.I.R.E., City and Guilds, &c. Study at home under highly qualified tutors.—Write for free book: International Correspondence Schools, 71, Kingsway (Dept. 446A), London, W.C.2. E157 E

SITUATIONS VACANT

APPLICANTS ARE ADVISED TO SEND COPIES NOT ORIGINALS, OF THEIR TESTIMONIALS UNLESS OTHERWISE REQUESTED.

APPLICATIONS ARE INVITED for the post of Mechanical Engineer in Ceylon with a long established Engineering Firm with Head Office in London. The Work covers a wide range of engineering practice.

Applicants, who should be unmarried and preferably not older than 27 years of age, should have served a full workshop apprenticeship in Mechanical Engineering, hold the Higher National Certificate and preferably have gained post apprenticeship experience in Drawing Office and outside erection work.

Commencing remuneration offered is the equivalent of approximately £1,150 per annum with prospects of generous future increases. Terms of service include First Class steamer passage and periodic furlough in the United Kingdom. Medical expenses are paid. Outfit allowance of £100 paid on appointment. Liberal provision is made for retirement including the payment of a Pension at age 55 years.

Applicants are invited to apply in writing giving particulars of education, training and experience to Box JY/24 c/o 95 Bishopsgate, London, E.C.2. E6892

ASSISTANT ENGINEER, aged 27 to 35, A.M.I.C.E., and/or A.M.I. Struct. E. Sound experience design supervision reinforced and prestressed concrete structures. Some experience of structural steelwork an advantage. Salary according to age and experience, but not less than a £1000 p.a. Interesting and varied work, and good prospects. Luncheon vouchers are provided, and there is a pension scheme.—Apply in writing to Husband and Co. Consulting Engineers, 70 Victoria Street, London, S.W.1. E6904

ASSISTANT MECHANICAL ENGINEER

to understudy Chief Engineer of an expanding group for 2/4 years before managing a department. Age 30/35. Qualifications: A.M.I. Mech.E., or B.Sc. Experienced in technical and commercial aspects of general engineering including Cranes, construction and earthmoving equipment, mechanical handling or similar. This is an excellent opportunity for man with initiative and ambition Salary £1,000/£1,500 according to ability and experience Box No. E6911 "The Engineer".

BRITISH OXYGEN ENGINEERING LIMITED

SENIOR PRODUCTION ENGINEER

PLANNING ENGINEER

WORKS LOADING OFFICER

Three interesting and important positions offer excellent opportunities and attractive conditions of service to men experienced in chemical engineering plant production.

Local interviews can be arranged. Holiday arrangements for 1959 honoured.

Apply in writing giving details of experience to:—
Employment Officer (E/G 4580)
BRITISH OXYGEN ENGINEERING LIMITED,
Angel Road, Edmonton, London, N.18
E6893

DESIGNER—ESTIMATOR required by well established firm of sewage pump manufacturers in the Midlands. Applicants must give details of experience, age and salary required. Box No. E2477, "The Engineer".

MECHANICAL AND ELECTRICAL ENGINEERS
Henry Wiggin & Company Limited,
Holmer Road, Hereford.
require
A QUALIFIED MECHANICAL ENGINEER
and
A QUALIFIED ELECTRICAL ENGINEER
AS ENGINEERING ASSISTANTS

or interesting and varied work, in the first place in connection with their Expansion and Modernisation Scheme at Hereford.

Applicants should be under 40 years of age and possess either an Engineering Degree or Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers. They should have had a first-class practical training and engineering experience, covering preferably, one or more of the following:

Steelworks Plant and Equipment.
Extrusion Plant and Machinery.
Heavy Hydraulic Equipment.
Rolling Mills and Ancillary Equipment.

Attractive salaries will be paid to the successful applicants.

Excellent Welfare and Canteen facilities will be available and a generous Non-Contributory Retirement Scheme is in operation.

Apply in writing, giving full particulars of education, training and experience, to the Chief Engineer.
HENRY WIGGIN & COMPANY, LIMITED
HOLMER ROAD, HEREFORD.
E6834

METHODS ENGINEER, ELECTRICAL required for established Diesel Manufacturing Company in East Anglia. Applicants should be fully qualified Electrical Engineer with first class knowledge of modern electrical equipment and test and procedures. Ability and personality to organise and take full responsibility for test problems and liaison with electrical manufacturers on technical problems is essential. Good salary will be paid to the suitable applicant. Applications in writing, stating age, qualifications and experience to Personnel Manager, Box No. 691, A.K. Advtg. 212a, Shaftesbury Avenue, London, W.C.2. E.6856

SITUATIONS VACANT

OPERATING ENGINEERS for high pressure water tube boilers required by well known firm of Boiler Contractors. Applicants must have previous experience and be prepared to travel anywhere in the U.K. and abroad. Minimum qualifications B.O.T. Certificate (Steam). Membership Institute of Marine Engineers or H.N.C. an advantage. Salary commensurate with experience and qualifications. Pension scheme. Apply giving full details of age, previous employment and qualifications in confidence to Box No. E.6851 "The Engineer".

QUALIFIED MECHANICAL ENGINEER aged 25/30 required by medium sized General Engineering Works, Bolton area. Knowledge of estimating for castings and production allied to general engineering Knowledge of hydraulic presses, rubber machinery and/or glass machinery an advantage. Salary according to experience and qualifications. Pensions Scheme and commission. Progressive appointment for the right man. Box No. E2479, "The Engineer".

REACTOR SAFETY

Engineers are required by the United Kingdom Atomic Energy Authority, Risley, Warrington, Lancashire to undertake duties in the Reactor Division of its Health and Safety Branch.

This important and expanding Branch is required to examine and report on the design, construction and operation of nuclear reactors and posts are available in sections concerned with:

(a) The technical and engineering calculations arising from the study of particular reactor systems. Problems involved cover heat transfer, performance assessment of heat exchangers, gas circulators, flow of liquids or gases in branched systems and stress analysis in pressure vessels.
(b) The evaluation of the performance of mechanical plant. For these posts a good background of experience in pressure Vessel Technology or Welding and Fabrication Techniques or Mechanical Plant and component design is required, and
(c) The preparation of Codes of Practice to establish and promote safe design and operation. For these posts experience in plant operation and engineering design together with the ability for analytical thinking are required.

Applicants must have served a recognised engineering apprenticeship and be corporate members of a senior engineering institution, or possess an honours degree in science or engineering and have at least three years relevant industrial or research experience.

Where necessary successful candidates will be given training at the Harwell Reactor School and operating experience on Authority Reactors.

Starting salaries will be assessed within the scales £1,855 to £2,155 or £1,345 to £1,800, according to ability and experience.

The posts are permanent and pensionable. Staff Housing scheme.

Send postcard for application form, quoting reference D.E. 8/J1, to Recruitment Officer at above address.

Closing date: 31st July, 1959. E6887

SHELL-MEX AND B P LTD have a vacancy in their Southern Division for a qualified Engineer. The position is based at Southampton and the Division covers most of the South Eastern Counties. Candidates should have had thorough training in workshops and possess either Corporate Membership of the Institutions of Civil or Mechanical Engineers or have passed parts A & B of one of these Institution's examinations (or have qualifications entitling them to exemption from such examinations). Experience on pumps and pipelines or building construction will be advantageous. Excellent Pension Scheme. Starting salary commensurate with qualifications and experience. Apply in writing giving full details of age, qualifications and experience to the Staff Manager, (Ref.D/173), Shell-Mex House, Strand, London, W.C.2. E6862

STRUCTURAL STEELWORK DESIGNER with a good knowledge of light structures as well as conventional steel design required by Consulting Engineers. Five day week. Pension Scheme. Holiday arrangements honoured. Apply stating details of experience and salary required to Alan Marshall & Partners 73/74 High Holborn, W.C.1. E2476

STEELWORKS PLANT REPRESENTATIVE wanted for Northern England and Scotland. Essential qualifications include comprehensive technical experience and a good personal connection in Steelworks for the application of medium/heavy engineering and fabrication products. Experience in Chemical Engineering and Bridge Construction would be valuable Commensurate salary, car etc., and excellent prospects offered. Write full details of career in strict confidence to Box E6891, "The Engineer".

PUMPS—Technical Sales Representative. A vacancy occurs in the Manchester Office of Drysdale & Co., Ltd., engaged in the manufacture of all kinds of pumping plant. Applications are invited from men between 25 and 35 years of age with good personality and a capacity for original creative thinking. Applicants should be apprentice trained and hold H.N.C. or equivalent. The position offers excellent prospects with a progressive salary scale and there is a superannuation scheme in operation. Please reply direct to the Secretary, Drysdale & Co., Ltd., Yoker, Glasgow, W.4. giving details of age, past experience and training, etc. E6896

THE BEECHAM GROUP has a vacancy for a Senior Chemical Engineer (30-40) with experience in Central Plant Design and operation and a sound engineering background. Experience in refining or fermentation an advantage but not essential. This is a senior appointment and carries a commensurate salary together with non-contributory pension fund and profit participation scheme. Application in writing giving full details of age, qualifications and experience and quoting reference SCE 35, should be forwarded to the Personnel Controller, Beecham Group Limited, Beecham House, Great West Road, Brentford, Middlesex. E6912

QUALIFIED MECHANICAL ENGINEER, age 25/30 required by medium sized General Engineering Works, Bolton area. Duties design and research in existing and new productions. Experience in large hydraulic presses, rubber machinery and/or glass machinery an advantage. Salary according to experience and qualifications. Pension scheme and commission. Progressive appointment for right man. Box No. E2482, "The Engineer".

SITUATIONS VACANT

OPPORTUNITY FOR HARDWORKING CONSCIENTIOUS YOUNG ASSISTANT 20-25 with machine tool and engineering knowledge, in a progressive department with large firm having considerable other interests. Box No. E2483, "The Engineer.

TECHNICAL WRITERS

are required by

U.K.A.E.A., BRACKNELL, BERKS.

POST A (Ref. 5012 25): to prepare instruction manuals, test specifications and user handbooks for a wide range of electronic equipment used for instrumentation in the atomic energy field.

POST B (Ref. 5013/25): to prepare circuit component, spares and embodiment loan lists for electronic equipment designed at A.E.R.E., Harwell, and to maintain liaison between electronic designers at Bracknell and component standardisation officers at Harwell.

A recognised apprenticeship or equivalent training, appropriate experience in technical writing and (for post A) experience in electronics work are essential; O.N.C. or equivalent would be an advantage.

Salary: £905 (at age 30)—£1,085.

Please send a POST CARD, quoting the appropriate reference number to the Group Recruitment Officer, U.K.A.E.A., Atomic Energy Research Establishment, Harwell, Berks, for details. E6888

YOUNG QUALIFIED ENGINEER required to fill vacancy of Field Service Engineer/Demonstrator previous knowledge Spring Making and/or Wire Trade an advantage. Successful candidate will be given three months training in Switzerland engagement subject to contract. Write giving details of age, qualifications, experience, salary required to Box No. E2481, "The Engineer".

MISCELLANEOUS

PROFESSIONAL TRANSLATOR TEAM accepts free lance specialised work on Production and Electrical Engineering from and into Russian and other European Languages. Quick delivery, low prices. Box No. E2480. E2480

TIME RECORDERS, Sales, Rentals, Service, Telephone Hop 2239.—Time Recorder Supply and Maintenance Co., Ltd., 157-159, Borough High Street, London, S.E.1. E110,

BUSINESS OPPORTUNITIES

REMPLOY SPONSORSHIP SCHEME.—Send for details which show an attractive proposition to manufacturers.—Write to the Managing Director, Remploy, Ltd., 25-28, Buckingham Gate, S.W.1, or telephone VICtoria 6621 (12 lines). E155 o

ADVERTISER, PRIVATE INVESTOR desires to purchase whole or part interest in concern under progressive management making annual net profit of £15/50,000. Box No. E.158, "The Engineer".

FOR HIRE

BELLMANS MASTS FOR HIRE, to lift from 1 to 20 tons, 30ft. to 150ft. Blocks and tackle. Hand-operated winches. From £1 per day.—BELLMAN'S (Phone: SLOane 5259), Hobart House, Grosvenor Place S.W.1. E103 K

SUB-CONTRACTING

KELLERING AND CAM PROFILING capacity up to 8ft. by 6ft. or 6ft. diameter.—ARMYTAGE BROS. (KNOTTINGLEY), Ltd., The Foundry, Knottingley, Yorkshire (Telephone: Knottingley 2743/4). E116 MW

CASTINGS.—We can save your porous castings, ferrous or non-ferrous, by an approved impregnation process; sample castings treated; A.I.D. approved. —Recupero, Ltd., 66, South Harrow Viaduct, Harrow, Middlesex ('Phone, Byron 1178). E109 MW

FOR SALE

BOILER: One No. 16C Cochran-Kirke Verticle Sinuflo Steam Boiler. Constructed in 1953 for 125 p.s.i. and with an evaporation of 4,800 lb/hr. F and A 212deg. F. when fired with town's gas with a calorific value of 450 B.T.U./Cu. Ft. Complete with mountings as follows:—Cast iron angle stop valve, check feed valve, double enclosed spring safety valve, blow-off valve (bronze), two gauge glasses. Trist feed regulator pressure gauge, Drayton low level cut out (electric), gas control, valve and solenoid-operated pilot valve, and gas governor. Further particulars may be obtained from the Secretary, British Rayon Research Association, Heald Green Laboratories, Wythenshaw, Manchester 22. E6919

FRED WATKINS
(ENGINEERING) LTD.

800-ton Fielding Vertical 4-column Downstroke Hydraulic Press, ram 23in. dia. by 14in. stroke, Daylight 2ft. 3in., Platens 5ft. 4in. by 4ft. 4in., with 2 pumps and controls, motorised 400/3/50.
Fielding 500-ton Vertical Downstroke Hydraulic Press, 42in. by 36in. platens, with pumps and motors.
Fielding 200-ton ditto, 3ft. stroke, with pumps and motors (5 available).
Fielding 100-ton ditto, 4ft. to 5ft. stroke, with pumps and motors.
Two 73ft. 4in. by 5ft. Kilns or Dryers, with Crofts Reduction Gear and 27 h.p. motor.
Two 26ft. by 4ft. Rotary Cooler or Dryers, with reduction gear and motor.
Available at low prices ex present sites to save cost of bringing into stock.

FRED WATKINS (ENGINEERING), LTD.
COLEFORD, GLOS. E151 G

FOR SALE

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Classified Advts. continued on page 7

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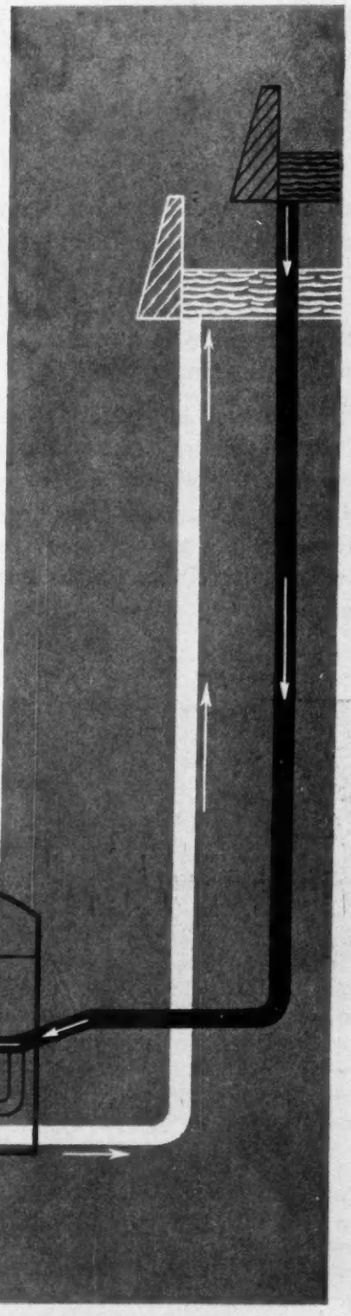

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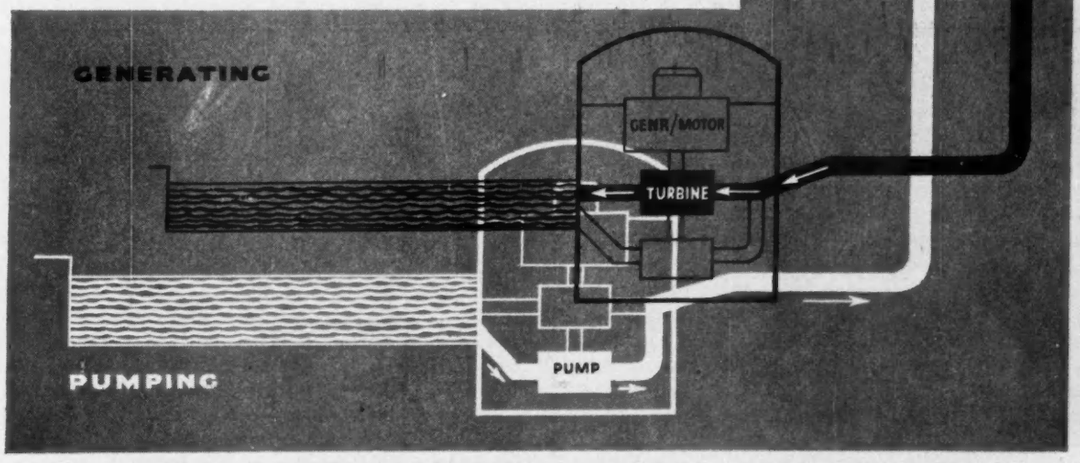

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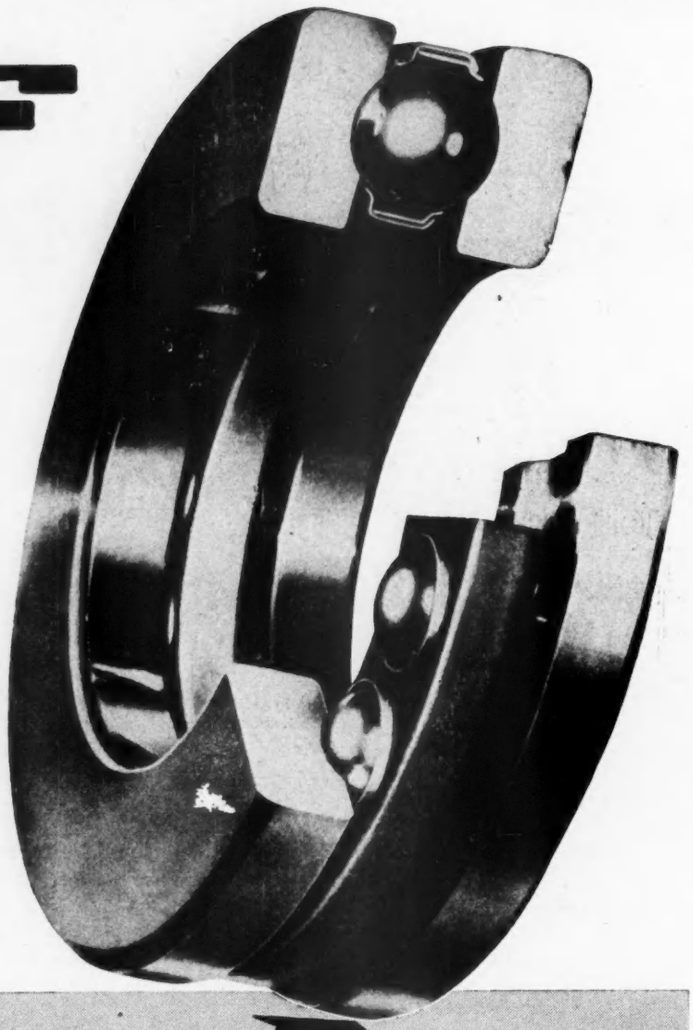

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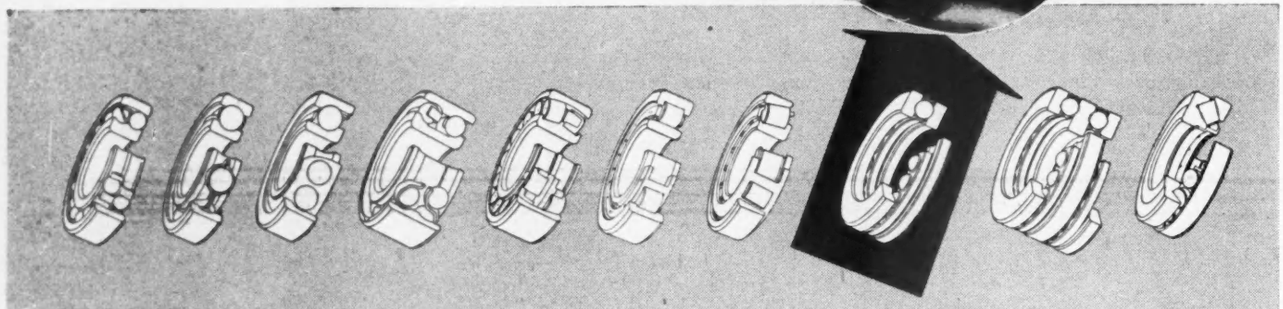

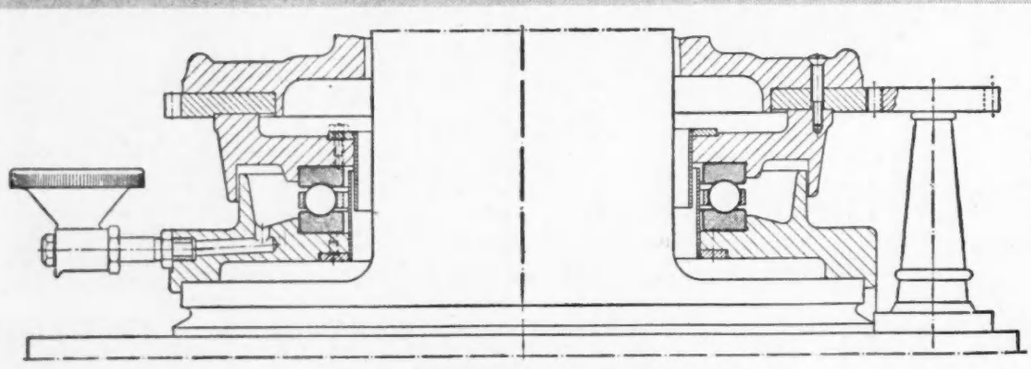

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THE ENGINEER

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WINFRITH ATOMIC ENERGY ESTABLISHMENT

Perhaps the outstanding impression left from a recent visit to Winfrith, the youngest establishment of the United Kingdom Atomic Energy Authority, is that only an industry with supreme confidence in itself could afford a major project of this kind. For Winfrith would be regarded as a large research and development undertaking, even if it were supported by an old established and prosperous industry. It is very much the more so because it is sponsored by an industry which is in its infancy and with few assets except faith in the future.

As explained by its new director, Mr. D. W. Fry, Winfrith comes into being as an offshoot from Harwell specifically to study new ideas and provide basic data for application to power generation. That does not imply that new ideas will no longer be studied at Harwell. It is simply an acceptance of the fact that a great volume of basic work is needed to support a broadly based reactor programme and that much of this work can best be done on a new site. The new establishment is intended mainly for the physics and engineering development required to take a new idea through the many stages leading up to those of a reactor experiment ora small prototype system. In this work there will be close co-operation with Harwell where the research and basic development on chemical, metallurgical and nuclear physics problems will continue to be centred. The first reactor experiment to be set up at Winfrith is the O.E.E.C. high-temperature gas-cooled reactor project known as "Dragon" in which six European countries (Belgium, France, Italy, Luxembourg, the Netherlands and Western Germany) are collaborating, through Euratom, with Austria, Denmark, Norway, Sweden, Switzerland and the United Kingdom. This joint project covers a five-year period during which the total expenditure may amount to £13,600,000. It has a two-fold object: first, to carry out a research and development programme on high-temperature gas-cooled reactor systems and secondly to design, build and operate a reactor experiment based on the results of this work. The first of these objectives is already in hand: for example the zero energy reactor "Zenith" (part of Britain's own programme) which will be used for checking the reactor physics design calculations for the high-temperature experiment; and secondly the exponential experiment to assess the reactor core arrangements for "Zenith".

So much for the "Dragon" project with its associated experiments which will explore the potentialities of the gas-cooled graphite-moderated reactor in the foreseeable future. What of the more distant prospects? There is the Dounreay fast breeder experiment, but the time scale of its development is still obscure. In the meantime sea transport is offering a tempting field for exploitation of the new prime mover and, for smaller reactors, the claims of boiling water and pressurised water systems, amongst others, are pressing. We note that, in addition to the two zero energy reactor halls, the Winfrith establishment has six acceptable sites for other experiments. We hope that one or more of these sites may soon be earmarked for other experiments as the Winfrith establishment gets into its stride in its study of new ideas and their application to power generation.

NUCLEAR LEGISLATION

The Nuclear Installations (Licensing and Insurance) Act received the Royal Assent recently. Broadly the Act aims to ensure that nuclear installations on land are subjected to the necessary controls for safety of the public and that the owners of these installations make proper provision for paying compensation to anyone who may suffer injury or damage by radioactivity. Two means to this end are provided—licensing and insurance. Construction of nuclear reactors, and other installations which may be prescribed, will need a licence from the Minister of Power (in Scotland, from the Secretary of State) who may impose safety conditions. To help him in deciding the conditions of the licence and in seeing that they are met, he has the power to recruit a qualified staff of inspectors. As already announced the first appointment of this kind is that of Major-General S. W. Joslin, the present works general manager at Dounreay; he will be the chief inspector of nuclear installations. The second main provision of the Act is that every licensee will be liable to pay compensation for any injury to persons or damage to property resulting from radioactivity, even if it is caused by an unavoidable accident, except to the extent that the claimant may have been guilty of contributory negligence. Accordingly the licensee will have to hold insurance cover or to show that he has adequate liquid assets to meet his liability, which will be limited, in effect, to £5,000,000 for any one incident. In the very unlikely event that the compensation payable might exceed this figure the incident would be treated as a national disaster requiring special measures and Parliament would be required to decide how the excess compensation should be provided.

Some of the objections to the Bill in its original form have been met by the new Act. For example, because certain kinds of injury from radioactivity may not become apparent for many years it is stipulated that actions for damages may be instituted up to thirty years after the incident. However, since claims lodged after ten years will not be an insurable risk, the Act again requires that Parliament should determine the means for providing the compensation required. Because of its unique status the U.K. Atomic Energy Authority does not require to be licensed; however its liability under the Act is similar to that of licensees, but is not limited in amount. Furthermore there is provision to extend the liability of the A.E.A. to cover irradiated nuclear fuel during carriage and to apply the thirty-year limit to claims against the Authority. Finally as a security measure the extraction of plutonium and other dangerous fissile materials is limited to the Authority and to Government departments but they may authorise other persons to extract these materials (for research and development work only) subject to security controls.

WAGES AND HOURS

The executive of the Confederation of Shipbuilding and Engineering Unions has decided that a claim is to be submitted immediately for a "substantial wage increase" and a forty-hour week for workers in the shipbuilding and engineering industries. This decision comes as no surprise, for it springs from resolutions passed by the national committee of the Amalgamated Engineering Union and, subsequently, at the annual conference of the Confederation of Shipbuilding and Engineering Unions. Over the affairs of the latter body, the A.E.U., by virtue of its numerical strength, obviously exercises considerable influence. When the idea of this latest claim was first mooted by the A.E.U. national committee, an amount of 15 per cent was mentioned in the resolution. But the union confederation, following past practice, has, so far, named no actual figure, though many of the members of its constituent unions will probably have their thoughts upon the 15 per cent specified at the beginning of May by the A.E.U. One thing, however, seems clear about the latest decision. It is that the Confederation of Shipbuilding and Engineering Unions is determined to "have a go" for the immediate introduction of a forty-hour week. Evidently, the gradual achievement of a shorter working week is no longer its intention. It would be unbecoming to comment on the likely future progress of a claim which must soon reach the first stage of negotiation. Nevertheless, it is appropriate to recall that Mr. Carron, the president of the A.E.U., expressed a couple of months ago his view that, at present, the employers were not going "to concede a wage increase and a shorter working week simultaneously."

Norwegian Boiling Heavy Water Reactor

The boiling heavy water reactor (b.h.w.r.) of the Norwegian Institutt for Atomenergi at Halden reached criticality recently. This reactor is moderated and cooled with heavy water and fuelled with natural uranium. It is built in an excavation in a hillside near a paper and pulp factory at Halden, 120 miles south of Oslo. It is the first boiling heavy water reactor in the world and it will be used for a joint research programme organised by the European Nuclear Energy Agency of the O.E.E.C. in accordance with an agreement signed in June 1958. The participants are Austria, Denmark and "Euratom" (representing Belgium, France, Germany, Italy, Luxemburg and the Netherlands), Norway, Sweden, Switzerland and the United Kingdom. There is provision for a joint budget, research staff and programme of work with the reactor for three years.

With its initial charge the reactor has a thermal rating of about 5MW which may be raised to about 10MW by using a rearranged core consisting of enriched UO_2 fuel elements canned in stainless steel.

Heavy water (D_2O) boils in the core and the resulting steam passes through the primary circuit of a boiler, while light water circulates in the secondary side. Only the latent heat is abstracted from the steam and the condensed D_2O returns, with little loss of temperature, to the top of the reactor.

Apart from its main function of the study of the b.h.w.r. as a power plant the reactor will be used to produce about 15 tonnes of steam per hour in the secondary, light water, circuit. Eventually it is proposed to use this steam for process work in the adjoining paper factory.

The reactor was designed at the Netherlands-Norwegian Joint Establishment for Nuclear Energy Research, Kjeller, and was built by the Norwegian Institutt for Atomenergi. The main sub-contractors were the Kvaerner - Myhren - Thune Combine (mechanical installations), the Chr. Michelsens Institutt (control and instrumentation), Hoyer Ellefsen (civil engineering), the U.K. Atomic Energy Authority (fuel), and the U.S. Atomic Energy Commission (heavy water). The total cost of the plant, including heavy water and the first uranium fuel load, was 3.5 million dollars.

Research on Pumps and Surge Tanks

The British Hydromechanics Research Association recently held open days at its laboratories at Harlow, at which demonstrations of the principal researches now being undertaken were to be seen. The following notes relate to a few specific aspects of this work.

Testing with air rather than water has both technical and economic advantages, the Association considers, and the method has been developed and used in pump research. Progress has thus been made towards a better understanding of the complex flows in centrifugal pumps, with very modest apparatus.

Friction effects have been studied by changing the roughness of surfaces and by the measurement of boundary layers. Disc friction torque on the outer surfaces of the impeller shrouds, which was thought to be completely lost, can contribute as much as 40 per cent of its power to raising the delivery head. In the impeller waterways, roughness on the side walls is just as important as on the vane surfaces but, surprisingly, it was found that no part of one impeller was specially sensitive to roughness. Friction on the surface of a volute is an important cause of loss of head in some pumps and roughness on the casing side walls facing the impeller shrouds increases power consumption.

Volute flow is not well understood and designers differ in their views on such questions as whether a volute is a constant velocity passage or a free vortex one, the best volute cross section, and whether it should be symmetrical about the impeller mid-plane, and the best setting of the discharge branch. Measurements relating to some of these aspects were shown.

Internal leakage is unavoidable but, like disc friction, the corresponding power loss has been overestimated in the past. Experiments have shown that when leakage is prevented, pump output is raised only by the addition to the delivery of a flow having the low head of the fluid at the entrance to the wearing rings.

Balancing axial forces on a pump impeller depends on the radial pressure distributions outside the impeller and the pressure drop across balance holes in the impeller. Measurements have shown that the discharge coefficient of balance holes can be high in spite of the rotation of the holes. The radial pressure gradient can exceed that of a rotation at half the angular velocity of the impeller and is very sensitive to any radial flow in the gap.

In the design of intakes to a turbine or pump, care must be taken to prevent the formation of air-entraining vortices and swirl. The air carried into an intake by a vortex may easily amount to 5 per cent of the water flow which can have disastrous effects on the efficiency of hydraulic machinery. In short intakes, swirling flow can cause serious drops in pump efficiency.

The presence of persistent rotational flow in the body of water approaching the intakes is the basic cause of air-entraining vortices. The strength of this rotational flow depends on the siting of the intakes relative to the direction and boundaries of the approaching flow.

Scale models can be used to study flow patterns in the approaching flow and to examine the possibilities of air-entraining vortices occurring under particular circumstances. Although these models cannot give accurate quantitative results, because scale effects are not properly understood at present, they do indicate ways of improving the design and possible remedies should air-entraining vortices be found in practice.

The Association's 1 : 30th scale model of the two intakes in the upper Stwlan Reservoir of the Ffestiniog pumped storage scheme has been used to study the conditions causing air-entraining vortices when the reservoir is drawn down through the normal daily range of 65 ft. Various remedies have been tried and compared on the model.

A study of the flow conditions through Stwlan intakes and bends at the tops of the shafts and through the bends and bifurcations at the bottom of the shafts has been made on two separate air models of scale 1 : 14 5 and the head losses have been determined. By the addition of suitable fairings the losses in the upper bend were reduced by some 50 per cent, amounting to an additional 400 W.H.P. available at the turbines.

Complete solutions of the equations defining mass oscillations in a surge tank system when square law resistance is taken into account require a lot of tedious calculation if done by the normal step by step methods. The effects of changing the parameters involved, surge tank area, pipe area and length are not obvious in the normal analytical method. By using a repetitive d.c. analogue computer where both input and response are displayed continuously on a cathode ray oscillograph the effect of changing parameters can be readily observed.

The N.P.L. electronic simulator was used to investigate surge problems associated with the design of the siphon draw-off tower from Tryweryn reservoir and some sample applications of this method were to be seen.

Multiple-Unit Boat Trains

FROM June 15, the 10 a.m. Victoria to Dover boat train of the Southern Region, connecting with the Ostend service, is being operated with sets of the multiple-unit express stock built for the Kent coast electrification, and is routed via Faversham and Canterbury. One of the motor coaches is a motor luggage van with provision for manœuvring under battery power on lines not equipped with a third rail, as at the quayside. This vehicle has similar traction motors and control equipment to the motor coaches with passenger accommodation, but is also provided with means for lifting the collector shoes and with a traction battery. To run on battery power, a battery control switch (operative only when the master controller is " off ") is pressed, so energising a magnet valve admitting air to a shoe-lifting cylinder. The motor coach is then driven in the normal way by means of the master controller handle.

While working on the battery the driver watches the " state of charge " indicator and if necessary returns to the third rail to recharge. When the master controller and the control master switch are both at " off," the shoe-lifting cylinder valve is de-energised, allowing air to escape and the shoe to drop on to the live rail. The motor-generator set then starts at once and begins to charge the traction and control batteries.

Two of the ten vans of this kind on order have now been built, and it is intended to operate a second boat train service with multiple-unit stock in July. These are the first regular multiple-unit boat train workings on the Southern Region. Some use has been made in the past of multiple-unit stock for relief passenger accommodation on the Victoria-Newhaven service, but on these occasions the registered luggage has been conveyed in vans on the main train, which has been locomotive-hauled. The Newhaven route had the first electrically-hauled boat train in this country. Although the line from Lewes to Newhaven and Seaford was electrified in 1935, the short spur from Newhaven Town to Newhaven Harbour was not converted until after the war. Up to that time the boat trains continued to be hauled by steam locomotives, but after the conversion the main service was taken over by the three C_0–C_0 motor-generator locomotives of the Southern Region.

Twenty-Third Salon Internationale de l'Aeronautique

The twenty-third Salon Internationale de l'Aeronautique was held at Le Bourget from June 12 until June 21. The event, in which exhibitors from fifteen countries participated, marked the Salon's fiftieth anniversary. It was held for the first time from September 25 until October 17, 1909, at the Grand Palais, Paris; the general commissioner being the late Robert Esnault-Pelterie, and the General Secretary, Monsieur André Granet, who on the present occasion acted as general commissioner. As befits a jubilee, the link with the past was emphasised in many ways; the Musée de l'Air exhibited a diorama of the first exhibition recalling several of the pioneer aircraft which were shown on that occasion. Many firms also had on view interesting displays of historic aircraft models. In order to mark the flight by Louis Blériot across the English Channel on July 25, 1909, a 'Starfighter' of the U.S. Air Force completed the round trip, Paris-London-Paris, in thirty-seven minutes, the same time taken by Blériot on his 40km.-long flight fifty years ago.

Among the aircraft exhibited by Société des Ateliers d'Aviation Louis Breguet we noted the 'Deux Ponts' 765 'Sahara', a modified 'Deux Ponts' of 54 tons all-up weight, 29m. long, 43m. span, and 10·2m. high, powered by four Pratt & Whitney R.2800-CB.16—CB.17 engines. As a military transport it can carry up to 164 people (126 men fully equipped), a 14-ton tank, or parachute unit loads of 6 to 8 tons. Its speed is quoted as 400km/h., and its maximum range (with wing tip tanks) 4000km. The fuselage has a volume of 167m.^{2} and a floorspace on its two decks of 81·5m.^{2}

A 'Taon 1001' powered by an 'Orpheus 3' engine was shown in the static display.

Other Breguet aircraft included the 1050 'Alizé' anti-submarine aircraft powered by a Mark 21 Rolls-Royce 'Dart' of which a series of seventy-five is being delivered. Some fine examples of the company's glider production were in evidence. The 904S 'Nymphale' is a tandem seater of 20m. span and 20m.^{2} wing area. We illustrate the new 905 'Fauvette' single-seater (Fig. 1) which has a span of 15m., a wing area of 11·25m.^{2}, and a length of 6·15m. Its empty weight is 148kg., its all-up weight, depending on the equipment carried, 230 to 260kg. Much use has been made of plastics in its construction.

In the display by Générale Aeronautique Marcel Dassault were to be seen the 'Mirage' (Fig. 2) in its 'IIIB' two-seater trainer version, and the 'Etendard IV-M', the naval version of that aircraft. The 'Mirage' delta-wing interceptor and tactical support aircraft is powered by a SNECMA 'Atar' turbo-jet with afterburner of 6000kg. thrust and one removable SEPR '840' rocket engine, and is capable of exceeding Mach 2 when carrying full armament. It can take off and land in under 800m. Equipped with high-lift devices, the supersonic 'Etendard IV-M' is intended for operations at low or medium heights based on aircraft carriers. The M.D. 415 'Communauté' (Fig. 3) appeared in the flying display. It can carry ten passengers and a crew of two. Powered by two 'Bastan' turbo-prop engines, it has a 2500km. range at a cruising speed of 500km. Its military version, the M.D. 410 'Spirale', has not yet flown.

Among first appearances must be counted the Max Holste 260 'Super Broussard' light transport, which made its maiden flight just before the exhibition. Shown in its version as a flying ambulance, the prototype was powered by two 600 h.p. Pratt and Whitney engines which, however, will be replaced by 750 h.p. Turbomeca 'Bastans'. The leading dimensions are: length 17·09m., height 6·565m., and span 21·928m. The high-wing aircraft can take off with a gross weight of 7700kg. in 250m. and clear 15m. in 410m. It can carry up to twenty-three persons at an economic cruising speed of 350km/h., over a mean range (with 25 per cent reserve) of 1000km.

Morane-Saulnier displayed the M.S. 1500 'Epervier' light co-operation and ground-support aircraft. This armoured two-seater is powered by a single 'Bastan' turbo-prop engine, and can take off after a 120m. run. Shown in public for the first time was the Nord 'Griffon 02', a combined turbo-jet and ramjet experimental aircraft, with a 60 deg. swept back delta wing of 8.1m. span. An earlier version of this remarkable, highly supersonic design was illustrated in our issue of January 4, 1957, p. 17.

Some interesting developments were seen in the light aircraft field. The 'Tipsy Nipper' of Avions Fairey S.A., Aerodrome Gosselies, Belgium (see "The Engineer", May 2, 1958, p. 650), is a single-seater of 6m. span with an empty weight of only 165kg. and an all-up weight of 300kg., powered by a 40 h.p. 'Hepu' Volkswagen engine. It has a tubular fuselage frame, tricycle undercarriage, and is fully aerobatic. The Wassmer WA-40 first flew on June 8; it is a 265/285km/h. four-seater fitted with a 180 h.p. Lycoming engine. A twin-engined six-seater version of the 'Do.27', the 'Do.28', was shown by Dornier, but no performance figures are as yet available. Simmering-Graz-Pauker A.G., Vienna, exhibited the prototype M.222 'Flamingo' twin-engine (2× 150 h.p. Lycoming) low-wing six-seater monoplane. This machine utilises much glass fibre

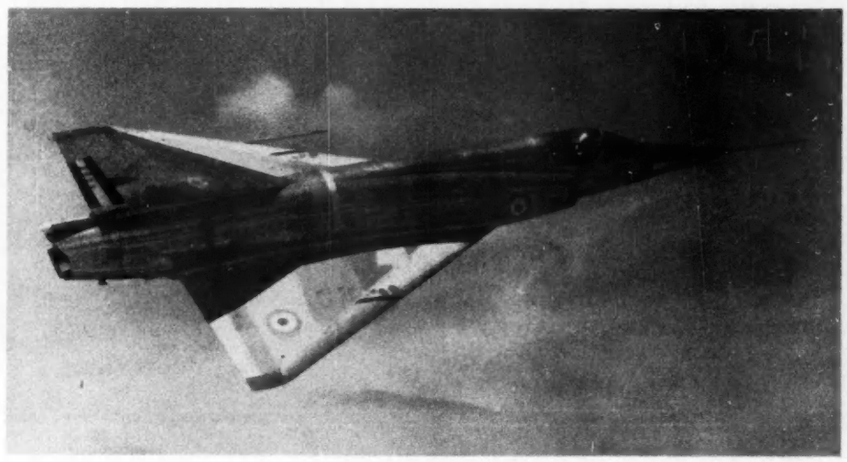


Fig. 2 'Mirage III A' in flight

Fig. 1—Breguet 905 'Fauvette' sailplane. Span 15m., length 6.15m.

Fig. 3—M.D.415 'Communauté'

reinforced plastic in its construction. The 11m.-span wing is fitted with tanks at the tips. We illustrate in Fig. 4 the Pilatus PC6 'Porter', an all-metal prototype built by Pilatus Aircraft Works Ltd., Stans/Lucerne. It is a multi-purpose transporter including in its all-up weight of 1800kg. a useful payload of up to 500kg. The large unobstructed cabin is fitted with wide double doors and floor hatch. With a 340 h.p. engine, full load take-off is about 100m., and a service ceiling of 6200m. is attained. Alternatively, the plane can be fitted with a 260 h.p. engine, and it can be equipped with combined wheel/ski landing gear or with floats. Five passengers, or two stretchers and two attendants may be carried. The plane is readily adapted for aerial photography and other tasks.

Among the giants of the static exhibition we noted an Ilyushin-18 four-engined turbo-prop airliner for 75 to 100 passengers and a crew of five. This aircraft has a take-off weight of 54 to 61 tons, cruises at 650km/h., and with a service ceiling of 8000m. has a practical range (one hour's reserve) of 5000 km. Another Soviet plane on show was a TU-104B 100-passenger jet airliner. Powered by two RD-3M engines, this machine has a

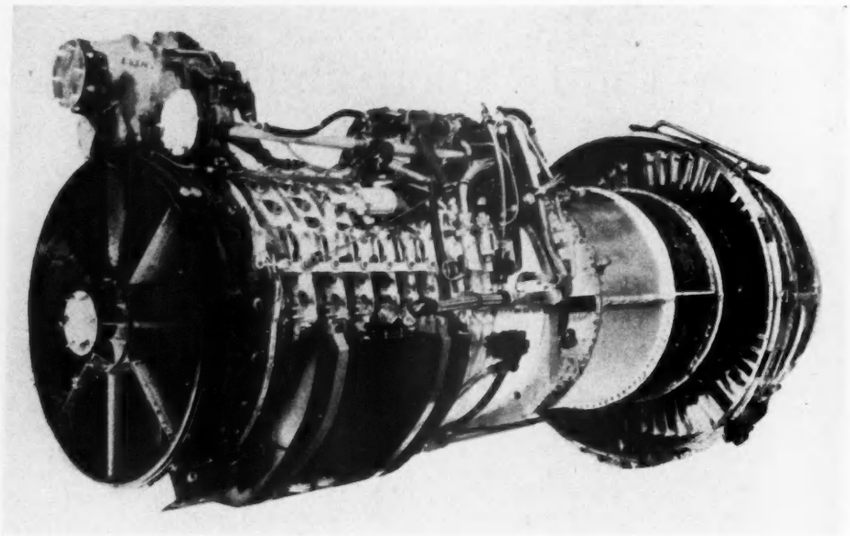


Fig. 5—General Electric 'CJ-805-23' aft turbo-fan engine

Fig. 4—Pilatus PC6 'Porter'

weight at take-off of 76 tons, cruises at 800 to 900km/h. (maximum speed, 1000km/h.), and has a range of 3000 to 4000km., with a 10 to 12km. ceiling; it has now been in service for three years. United States military aircraft included the Douglas C-133 'Cargomaster' with overall dimensions of 179·6 ft. span, 157·6 ft. length, and 48·3 ft. height, powered by four 6500 h.p. Pratt and Whitney engines. With a maximum weight at take-off of 282,000 lb. it can carry a payload of 100,000 lb. The machine first flew in April, 1956. Another aircraft exhibited was the Lockheed C-130 'Hercules' (four 3750 h.p. turbo-prop engines, maximum weight 118,000 lb.). The Armstrong-Whitworth A.W.650 'Argosy' Freightercoach, which first flew in January, attracted much attention. This multi-purpose cargo plane can carry up to 27,000 lb. in its 3680 cubic foot interior. With maximum take-off weight of 82,000 lb. it can carry 27,000 lb. of freight or 77 passengers, or any combination of these, for the cabin and cargo space are separated by a moveable partition and quickly convertible. Another noteworthy aspect is the truck-level floor which is provided with quick-release rollers. They serve to load and unload the special light-alloy pallets on which the cargo is carried. Powered by four 'Dart' engines, the 'Argosy' has a range of over 3500km. for 4·5 tons payload or 77 passengers. An illustration will be found in our issue of April 24, 1959, p. 649.

In the domain of engines, the International General Electric Company, New York, showed the 'CJ-805-23' aft turbo-fan engine giving a thrust of the order of 15,000 lb. for a weight of 3700 lb. (Fig. 5). In this engine a normal jet engine as gas generator drives a free rotor acting partly as turbine and partly as compressor for the air which substantially exceeds the amount of air passing through the basic engine, but moves at a lower speed. These two airflows are separately exhausted behind the fan to produce a higher airflow at a lower jet velocity, giving optimum efficiency at 500 to 650 m.p.h., i.e. over a range intermediate between propellers and pure jets. Incorporating an augmentation ratio of 1·56 : 1, the (CJ-805-23) will power the forthcoming 'Convair 600', at speeds of about 635 m.p.h.

The corresponding military version is the 'TF.35'. Like its 'ancestor', the 'J.79', the 'CJ-805-23' basic engine employs a seventeen-stage axial flow compressor of which the first six stator stages and the inlet guide vanes are variable to give optimum conditions over a wide range of speeds.

A large section of the display was devoted to rockets and missiles, including the American 'Atlas', 'Thor' and 'Redstone', as well as a comprehensive range of French and British developments. As an example of French work in this field, we illustrate the Matra 'R.422-B' ground-to-air missile (Fig. 6).

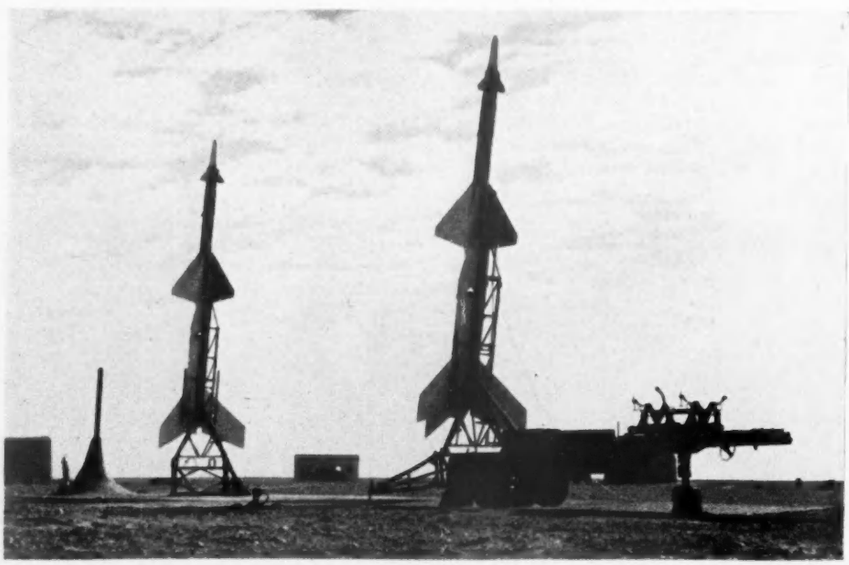


Fig. 6—'Matra R.422-B' supersonic, two-stage, solid propellant ground-to-air missile, developing 1600kg. thrust at take-off and attaining Mach 2·6. With combination of ground radar and final self-guidance, it is for use against targets at speeds of up to Mach 1

Electronic Apparatus Headquarters

Headquarters of A.E.I. electronic division, New Parks, Leicester

The headquarters of the newly formed electronic apparatus division of Associated Electrical Industries Ltd., at New Parks, Leicester, were opened recently by the Rt. Hon. Aubrey Jones, M.P., Minister of Supply. The electronic apparatus division is the newest of the so-called product divisions into which the activities of A.E.I. are being organised. In this new division are amalgamated the electronic apparatus interests of The British Thomson-Houston Company Ltd. (B.T.H.) and of Metropolitan-Vickers Electrical Company Ltd. (M-V). As the management company of the new division, B.T.H. at Rugby acts as the co-ordinating body with other divisions in A.E.I. and provides common services such as accounting (other than works accounting) and data storage.

The manufacturing resources of the division extend beyond the New Parks establishment at Leicester, where industrial electronic equipment is produced. There are also the Blackbird Road Works, Leicester, which concentrate mainly on military contracts. Industrial valves and semi-conductors are made at Lincoln. Manufacture for the division is also done at Trafford Park (Manchester), Rugby and Coventry. The total floor area exceeds 800,000 and there are more than 4,000 employees in the division.

Development and design is centred on New Parks, but will also be continued at Trafford Park for some years; the development and design of valves and semiconductors will be done at Lincoln.

The business of the division is organised into five trading groups responsible to the divisional executive: they are the servo group, the computer group, the radar group, the industrial control group, and the industrial valves and semiconductor group.

The New Parks site covers about 20 acres and Scudamore Road gives access to the south boundary which offers the present frontage; but to allow for the development of the proposed ring road around the west side of the city the prominent frontage of the site will be to the east (left of illustration). On the east there is the T-shaped office and laboratory block; the north and south wings face the future ring road and the west wing extends to the central road running south from the main gate. On the far side of this central road is the factory building which is steel framed with monitor roof having vertical glazing from north to south along the two sides of the main high bays. A plenum system of ventilation is installed.

The production plant includes a well-equipped press section for the manufacturing of metal cabinets. A metal finishing section provides for pre-treatment electro-plating or painting, with 48 pickling and plating tanks; the effluent is automatically neutralised in a B.T.H.-designed plant which continuously extracts samples from the effluent, measures the chemical concentration and then regulates the amount of neutralising agents, needed to limit the cyanide content to 1 :10^6.

There are two large sections for carrying out development work prior to full production: one is a model room for the manufacture of prototypes and for the study of modern techniques, such as printed circuitry; the other section is concerned with waveguide development.

All the executive commercial and engineering offices and development laboratories are in the T-shaped two-storey building on the east of the site. Each wing is 54ft wide, each floor being divided by a central corridor into 22½ft wide working areas which can be used for offices or laboratories, enclosed by moveable partitions to give flexibility of lay-out. Lengthwise the normal module is 12ft 6in which is the spacing of the piers and columns in the corridor.

The main accommodation is as follows: west wing (ground floor) offices and laboratories of computer group and communications laboratories of industrial group (first floor) offices; north wing, industrial group offices and laboratories; south wing, radar group offices and laboratories.

In the industrial group there are four main laboratories, concerned, respectively, with high-frequency heating, motor control, machine tool control and photo-electric and welding control; the first three of these laboratories have large doors through which heavy equipment can be moved. There is direct connection between the radar and the high test bay at the end of the south wing. A large screened room in this wing is equipped to enable high-frequency low-voltage measurements to be made free of interference.

Some Products of the Electronic Division

Several interesting exhibits were seen during a tour after the opening of New Parks. In the research laboratory, for example, we saw a silicon-controlled rectifier designed to be triggered into forward conduction by the application of a small current fed into a third electrode. An experimental unit was shown connected in a circuit for d.c. motor speed control, using a phase shift network in the triggering circuit. A "transistorised" jet engine igniter and a "transistorised" battery operated oscilloscope were also shown. An experimental version of a 6V, 10W Zener diode was shown stabilising a load varying from ½ to 2A and there was a specimen VX4164 travelling-wave tube amplifier designed for a frequency range of 7000—11,500 Mc/s.

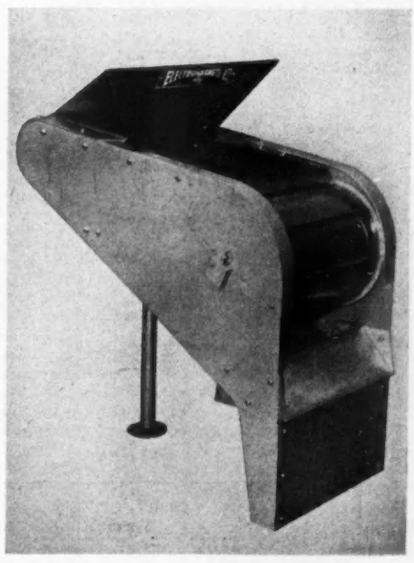
In the photoelectric and welding department we saw a system for positioning a travelling crane to within 1in of a predetermined point; equipment of this kind will be supplied for positioning loads to be lowered into the cooling pond at Berkeley nuclear power station.

An example of machine tool control seen during our tour illustrated the use of magnetic tape prepared by the "Director" MK1 digital computer for the automatic machining of turbine blade profiles.

Specimens from a wide variety of ignitrons included the BK56 designed to handle 150A at 20KV, used as a pentode rectifier in the Glasgow University synchrotron and other atomic research equipments; and the BK194 designed to handle 80,000A at 25KV, when used for short-circuit switching and capacitor discharge duties in the "Zeta" and "Sceptre" thermonuclear research equipments.

Magnetic Drum Separator

A magnetic drum separator for swarf separation and other duties which is now made in three sizes by Electromagnets, Ltd., Bond Street, Birmingham, 19, is fitted with a vibrating feed tray of stainless steel. The machine is available with 18in, 24in and 30in drums incorporating "Alcomax" permanent magnet alloy units which are stabilised to prevent deterioration in use. It is stated that these magnets should not depreciate more than 5 per cent in ten years, except by misuse. The drum in which the magnets are fixed is fitted with a stainless steel



Magnetic drum separator available with 18, 24 and 30 inch drums

cover having ribs to aid separation. This cover is mounted on non-magnetic end flanges with bronze bearings and carried on a steel shaft. A geared ½ h.p. motor drives the drum through vee belts at about 25 r.p.m.

A rotating vibrator drives the feed tray which is resiliently mounted to prevent vibration being transmitted to the machine frame. The feed hopper of the tray has an adjustable gate to control the rate of material flow along the tray. As illustrated the machine is built on a fabricated steel framework with a tubular rear support.

Differential-Drive Electric Locomotive for Underground Mines

An interesting development in electric traction by trolley and battery locomotives is based on the differential drive patented by Dr. H. E. J. Symes, formerly electrical engineer with New Consolidated Goldfields, South Africa. Such locomotives are now being built in the Hunslet Engine Company's factories both in Leeds, England and Johannesburg, South Africa, in several sizes. Basically the Symes differential drive consists of two compound wound d.c. machines coupled to the two input shafts of the differential gearbox. The output from the differential cage is coupled to the locomotive road wheels as shown in Fig. 1, and when the machines are running at the same speed in opposite directions the locomotive is stationary. The two

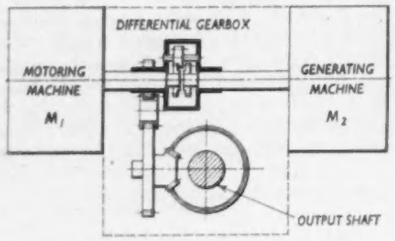


Fig. 1

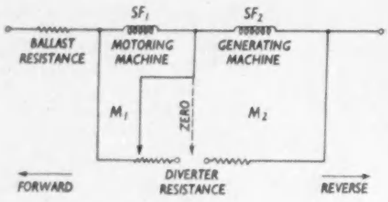


Fig. 2

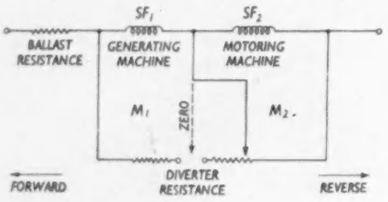


Fig. 3

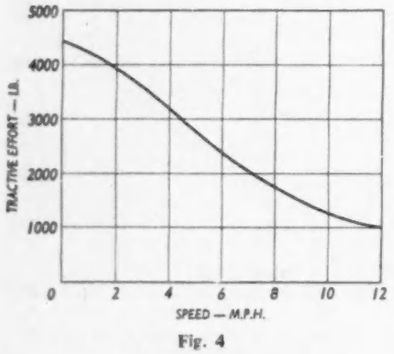


Fig. 4

machines are connected in parallel across the supply whilst their shunt fields are in series. Shunt field variation is by means of a diverter controller as shown in Figs. 2 and 3.

When placing the locomotive in service the two d.c. machines are started as compound motors under light load conditions and run up to the same idling speed. The locomotive is then ready for work.

Shunt field variation speeds up one machine, which motors, and reduces the speed of the other machine, which starts generating. Fig. 2 shows the arrangement for forward locomotive movement, and Fig. 3 for reverse locomotive movement.

Speed control and electrical braking down to zero locomotive speed are incorporated in dead-man handle. This simple control enables a completely unskilled and untutored driver to operate the locomotive with absolute safety. In an emergency it is even unnecessary to rely on the initiative of the driver to bring the locomotive to rest.

From tests carried out on a particular work cycle the overall power consumption was shown to be favourable and the voltage regulation was improved because of the absence of heavy peak line currents. The use

Fig. 5

of differential locomotives also reduces the substation size for a particular number and type of locomotives on a system and the load factor is greatly improved.

Crompton Parkinson & Co. Ltd., and Allen West & Co. Ltd., supplied the motors and control gear respectively, on the prototype locomotives, and negligible maintenance has been required on these locomotives.

A speed/tractive effort curve for a Hunslet '40' electric trolley locomotive with differential drive is shown in Fig. 4. A locomotive of this class employed on heavy mining duties is shown in Fig. 5.

The main dimensions, etc., of the Hunslet 0-4-0 type '40' differential trolley locomotive are as follows:

Gauge of railway	2 ft. (or to customers' gauge)		
Dia. of coupled wheels ..	1 ft. 8 in.		
Wheelbase	3 ft. 10 in.		
Height overall (less trolley)	3 ft. 10¾ in.		
Width overall	3 ft. 2½ in. (for 2 ft. gauge)		
Length over buffer beams..	7 ft. 7 in.		
Nominal voltage	550 volts		
Nominal horse power ..	40 h.p.		
Loco. speed at max. power	6¼ m.p.h.		
Max. loco. speed	12 m.p.h.		
Max. tractive effort at starting	4400 lb.		
Tractive effort at 6¼ m.p.h.	2300 lb.		
Tractive effort at 12 m.p.h.	1000 lb.		
Ratio: Adhesive weight/max. tractive effort ..	3.4 : 1		
Weight in working order..	7.5 tons*		
Max. axle load	4 tons*		
Minimum radius of curve loco. will traverse with ease	35 ft.		
Weight per yard of lightest rail	18 lb.		
	Level	1 : 100	1 : 50
Load loco. will haul at 6.25 m.p.h.	200	67	38
Load loco. will haul at 12 m.p.h.	85	25	12

* Weights in short tons (2000 lb.).

S.S. "Arcadia" Fully Air-Conditioned

For operating in the Pacific area and to extend the link developed by the Orient Line between Australia and North America to include Japan, the P and O Steam Navigation Company and its associate, the Orient Line have formed the "Orient and Pacific Lines". In this way triangular voyages between North America, Australia and Japan become possible and can combine with the company's existing services. To meet the sailing programme, seven of the passenger lines owned by the two companies, have been allocated to the service and are the P and O Company's "Himalaya", "Arcadia", "Chusan", and "Iberia" and the "Orsova", "Oronsay" and "Orcades" owned by the Orient line.

For their new service it was decided to extensively modify the existing ventilation systems so as to make each ship fully air-conditioned. The latest ship to undergo conversion was the "Arcadia" which recently completed a refit at the Belfast yard of Harland and Wolff Ltd. The liner, which was fully described in the issues of "The Engineer" dated February 19 and 26 and March 5 and 12, 1954, has a length overall of 720ft 9in, a breadth moulded of 90ft 6in, a gross tonnage of 29,664 and carries 657 first class and 735 tourist class passengers. The service speed of 22 knots is maintained by a twin screw installation of double reduction geared turbines of 34,000 normal s.h.p. at 130 propeller r.p.m. when supplied with steam at 500 lb per square inch and 800 deg. Fah. by three Foster Wheeler boilers.

When the liner entered service in 1954 only certain public rooms and a limited number of first-class cabins were air-conditioned so that for the ship to be fully air-conditioned has involved an enormous increase in the system. This was designed and manufactured by Thermotank Ltd., and represents an additional refrigerating load of about 11,000,000 B.Th.U. per hour to raise the total load to 16,000,000 B.Th.U's per hour. Under the circumstances the whole scheme had to fit existing arrangements and involved all the forty-five new air-conditioning units being tailor-made to operate in conjunction with existing supply fans and ducting. These made-to-measure units incorporate Thermotank viscous pattern air filters and provide 342,000 cubic feet of cooled air per minute which is the equivalent of 680 tons of air per hour. The additional machinery consists of six J. and E. Hall Arcton 6 vee bloc compressors each of 225 b.h.p. and driven through a Bibby coupling by a Weir single-stage impulse turbine. Two compressors and associated auxiliary machinery such as condensers, extraction pumps, evaporator, and sea water circulating pumps have been arranged in a space cut off from No. 3 hold and just forward of the refrigerating machinery room while the remaining four units have been placed aft in No. 5 hold. The new machinery compartments, which are ventilated by four 15,000 cubic feet per hour fans, have involved only a small loss of cargo space.

Temperatures and humidity throughout the ship are automatically controlled and since demand for either cooling or heating varies considerably from point to point, the ship has been divided into a number of zones for air-conditioning purposes. Humidistats in the ducting cause the controls to adjust the brine valves and air supply dampers so that the temperature and humidity of the air supplied from the central units suits the conditioning in that particular part of the ship and therefore achieves a uniform standard of comfort throughout. Each passenger can regulate the amount of air entering the cabin by adjustment of a new "D" pattern louvre which has

replaced the original Punkah louvres and which by a simple adjustment distributes incoming air in a diffused or concentrated stream as required. Thermotank automatic pressure control maintains a constant volume and prevents a build-up of air pressure, should several louvres be closed, so that there is no increase in air supply at the points still open. In maximum tropical conditions about 100 tons of water per day will be extracted from the atmospheric air before it is circulated.

When outside conditions allow, the system can be changed over to ordinary mechanical ventilation, so that port holes can be opened. In cold weather the air is heated by circulating brine, which has been warmed in automatically controlled calorifiers, through the same heat exchangers which are used for cooling.

While the foregoing major modifications were in hand the opportunity was taken to effect certain improvements in both first and tourist class accommodation. These consist of the introduction of two designs of glass fibre shower and toilet compartments in the first class and "walk through" pattern showers in the tourist class. In addition four experimental convertible cabins have been installed. These are constructed of hard-faced plastic panels and wood and are designed so as to permit a two berth to be converted into a four berth cabin with no disturbance to the main structure or fittings. The design is being developed for application to the new tonnage to be built in the future.

Glass Research Laboratories

Last month the new laboratories of the British Glass Industry Research Association were opened by the Chancellor of the University of Sheffield, the Earl of Halifax. This new facility at Northumberland Road, Sheffield, will enable the research association to expand current work and to undertake programmes of essential research which it was unable to handle owing to the limited space available in the premises of the Department of Glass Technology of the University of Sheffield.

Although B.G.I.R.A. was only founded in 1955 its formation actually stems from the notice taken of the large number of enquiries received by a Scientific Advisory set up during the First World War. This fact pointed the need of the glass industry for scientific assistance and a Department of Glass Manufacture was founded at Sheffield in 1915. For forty years it has fulfilled a dual role of training glass technologists and carrying out research on glass manufacture. During this period the output of the industry has increased enormously largely because of the introduction of machinery and of the results of research and development of glass technology and engineering.

The new building has a floor area of 20,000 square feet arranged on three levels, basement, ground floor and first floor and the construction was organised such that the building could be occupied in stages by the various sections, thus freeing space for the intake of students into the University. One wing of the ground floor is occupied by offices and a council room while the other houses the furnace room, refractory laboratory, glass technology laboratory and the fuel and furnace section. On the first floor are located the chemistry and physics sections, spectrography department, a large library a reading room and the work study section while the basement is largely devoted to storage spaces, together with a workshop, boiler room and electrical substation.

Although special prominence is given to new work the association serves the glass manufacturers not only by research but by the diagnosis and solution of both troubles and practical problems. Thus a considerable amount of the service involves visits of the staff for "on the spot" investigations and the collection of data.

A fundamental in the economic production of glass is the length of life of the refractory materials used in the building of furnaces, and to increase this the refractories section is concerned with the accelerated corrosion and erosion of refractories so as to produce refractory material more resistant to attack. On the practical side the furnace section has devised an empirical method of assessing the efficiency of tank furnaces.

Among the researches in hand in the glass technology group is the study of the effect of changes in raw materials on the rate of founding of glass and for this purpose it has built a rotating hearth furnace which ensures that each melt will be subjected to the same average conditions. In the furnace room are a number of furnaces, built by the staff, of varying capacities and maximum temperatures. Both the chemical and physics sections are concerned with investigations into the cause of defects of glass such as "stones," bubbles, etc., by chemical analysis, spectrography and X-rays. Better control of operations is under constant review and of particular interest is the work of the physics section in the deflection of glass panels when stressed under high wind pressures. The panels are placed in a box and subjected to water pressure and the deflections are recorded at about 50 points, the readings on the instruments being photographed every second to give data on the behaviour of the glass.

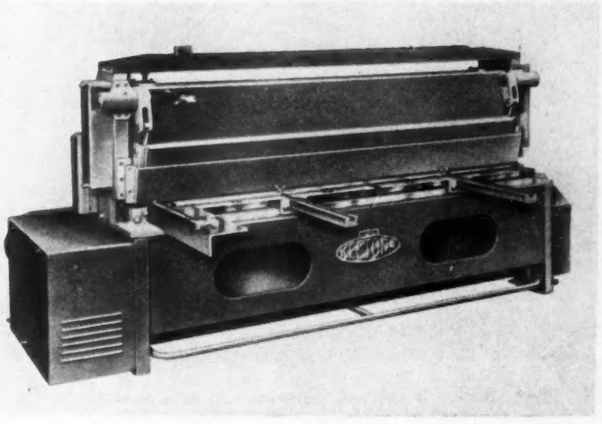
Techniques for improving the efficiency of the industry are the concern of the work study section and one of the methods employed is the "memomotion" camera which enables a close analysis of movements and group activities to be made and with a view to eliminating the unnecessary. The team also undertakes economic and statistical surveys of methods of manufacture to assist overall efficiency. Staff is available to answer queries and to tanslate articles. Each month a digest of information summarising published literature is prepared and circulated to members.

Shearing Machine

A SHEARING machine with a capacity of 8ft by ¼in thick plate, which is the first of a series now being made by Keeton, Sons and Co., Ltd., Greenland Road, Sheffield, 9, is illustrated above. The machine has welded plate end frames fixed together by a box design bolster on which an adjustable table carries the lower shear blade. A fabricated plate cutting beam moves in slideways built into the end frames, and its anti-friction plastic-lined slides are extended below the level of the blade to provide full beam support and resist sideways pull of the links through which it is operated. Counterbalance springs are enclosed in pockets at each end of the beam to give a smooth movement during operation of the machine.

The machine is driven by a 10 h.p. motor through worm gearing, vee ropes and a clutch at the splined end of an eccentric shaft, coupled by links to the beam. The clutch can be set for continuous running of the machine at forty-six strokes per minute or for single stroking under pedal control. Either a toggle operated spring hold-down or a hydraulically-operated hold-down can be fitted on the machine, and there is a handwheel-operated back gauge at the rear which can be set with reference to a calibrated dial.

The slideways in which the cutting beam moves are inclined at 2 deg. to the vertical to impart a clearance angle as the upper blade descends relatively to the fixed lower blade. Square four-edge blades are used and this beam angle in the cutting stroke presents the corner of the upper blade to the material, giving a similar effect to that of a two-edge bevel blade. Further, there is no risk of sheared material being trapped between the lower blade and the back gauge as the material is moved away from the fixed lower blade during the shearing operation.



Shearing machine for 8ft. by ¼in. plate

Soluble Cutting Oils

A RANGE of improved soluble cutting oils is now being marketed by Shell-Mex and B.P., Ltd., under the trade name "Dromus."

These reformulated grades of oils contain an improved coupling agent to facilitate the formation of a stable emulsion when the oil is mixed with cold water, and emulsions have not the odour of disinfectant normally associated with soluble cutting oils. In these new oils use is not made of a conventional phenolic coupling agent such as cresylic acid and this reduces the tendency of emulsions to cause irritation of tender skins or to irritate the nose, throat or eyes of machine operators. It is stated that in field trials, even with emulsion concentrations of over 5 per cent, there has been no evidence of skin irritation when using "Dromus" oil "B" recommended for use on lathes, capstans and milling machines. The grade "D" oil recommended for use at concentrations of 2·5 per cent and weaker for grinding has similar non-irritant properties and produces a translucent stable emulsion which remains clear enough to give an effective view of work during grinding. For use on machines where there is high tool loading and speeds the high grade "908" soluble oil has been developed and it is suitable for applications where a neat cutting oil would normally be used. This grade in addition to a non-phenolic coupling agent contains a special agent, which acts as an anti-weld medium under conditions of high temperature and pressure at the tool cutting edge, and it includes a fatty oil to reduce rubbing wear.

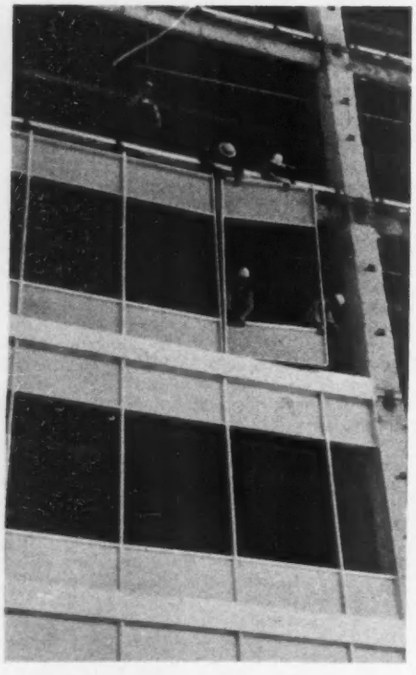
The introduction of a non-phenolic coupling agent for the oils introduced certain production problems which necessitated the development of new manufacturing techniques by the firm and the construction of special blending plant. Based upon techniques developed in the laboratory plant has been designed to produce the new soluble oils under efficient and hygienic conditions. The company has now erected several of these new plants to meet demands and give rapid delivery throughout the United Kingdom.

Kaiser building in Oakland, California, with main aluminium curtain walls and dolomite embedded concrete end walls

Aluminium in Office Building

BY OUR AMERICAN EDITOR

THE utility of aluminium as a building material is being displayed this year during the construction of the West Coast's largest office building—the main unit of the Kaiser Center project at Oakland, California. More than 2,000,000 lb of aluminium, or slightly more than 2 lb per square foot, are being used within the 976,000 square feet of gross area of the twenty-eight-storey arc-shaped structure which will be the world headquarters of the Kaiser industrial organisation.



Erection of curtain wall sections, made of extruded aluminium sections and gold-anodised aluminium spandrel panels

An interesting example of the use of the metal is in the building front and rear wall system. Both elevations are being enclosed with an aluminium curtain wall of natural, grey and gold aluminium alloy and tinted grey glass. The gold aluminium alloy was developed by the Kaiser Aluminum and Chemical Corporation especially for curtain wall construction. Other aluminium components in the building include acoustic ceiling panels, doors, hardware, railings, ornamental trim and furnishings, as well as many service, mechanical items and equipment, such as electrical busbar and wiring, conduit, ductwork, tubing, heat exchangers and appliances. This wide range of applications required a variety of rolled, extruded, drawn and cast aluminium products manufactured by Kaiser Aluminum or supplied by the company to the fabricators of the components.

The largest use of aluminium in the Kaiser building is in the wall system covering the curved front and back elevations. Approximately 1,230,000 lb of aluminium are being used to compose a sweeping arc facade, 420ft long and 390ft high, of gold aluminium alloy panels set in natural-finished extruded aluminium mullions and framed with wide, dark grey column covers and natural-finished beam fascia. This framing will outline the building steel structure against the bright, reflective gold of the panels, and the unusually wide column covers will provide well-defined continuous vertical lines. The windows are being glazed with grey-tinted glass. The gold aluminium alloy is produced by Kaiser Aluminum under a process developed by the company's department of metallurgical research. Unlike many other coloured aluminium sections which are coloured with dyes, the Kaiser Aluminum gold alloy gains its colour from the metal itself when anodised and is extremely lightfast.

The spandrel panels of the wall are a sandwich consisting of aluminium foil-faced insulating material covered on the exterior with an embossed sheet of gold alloy aluminium and on the inside with a painted finish aluminium sheet which forms the interior panelling of the building. Other aluminium components in the wall system include extrusions which will be used for frames around the glass and panels. A variety of aluminium sheet, extrusions and castings, will be used on the exterior for trim and ornamental purposes such as copings, flashing, sash, door and framing. The gold alloy also will be used to outline an illuminated "Kaiser Center" sign on the two end walls of the building, as well as the Kaiser emblem on the rear wall. These walls are composed of blocks of precast concrete with white dolomite aggregate stone surfaces.

More than 2,200,000ft of aluminium cable and wire—the largest installation of its kind in an American commercial building—are being used in the electrical system. In addition to the aluminium cable and wire, 32,000 lb of aluminium busbar and 28,000 lb of aluminium conduit in diameters from ¾in to 3½in will be installed. Office ceiling lights will be equipped with aluminium egg-crate light diffusers, and aluminium will be used extensively for the trim of spot, wall and other special lighting fixtures. Another large application of aluminium will be the air circulating system. Approximately 280,000 lb of aluminium sheet will be used for air ducts and, in certain areas, aluminium sheet also will be used for pipe insulation jacketing.

Appointments

MR. F. CARTWRIGHT has been appointed project engineer for the Bronx Engineering Co., Ltd., Lye.

MR. R. G. CAMP has been appointed headquarters sales manager of Square D. Ltd., and Mr. K. W. Liller has been appointed northern area manager.

SIR JOHN ELLIOT has been appointed a member of the board of the Colonial Development Corporation for a period of three years from July 1, 1959.

THE CENTRAL ELECTRICITY GENERATING BOARD announces that Mr. W. A. Storey, A.M.I.E.E., has been appointed to succeed Mr. E. C. Scott as system operation engineer to the north eastern division.

CAPTAIN H. W. D. STOREY, senior nautical surveyor in the Liverpool district office of the Marine Survey Service of the Ministry of Transport and Civil Aviation, has been appointed principal officer of the Bristol Channel district, Cardiff, with effect from August 8. He succeeds Captain D. W. Jones who is to take charge of the South and South West of England district, Southampton, in place of Captain D. W. McNab, who is retiring from the department.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY announces that Mr. S. R. White has taken up a new position as deputy director of public relations to the Ministry of Defence and will no longer be responsible for press matters on behalf of the U.K.A.E.A. Mr. Ronald Truscott has been appointed acting chief press officer of the U.K.A.E.A., and Dr. Horace Manley, technical press officer, is shortly to assume the post of chief science writer, assisted by Mr. E. Schoeters.

H. W. KEARNS AND CO., LTC., announces that Mr. O. Rendell has tendered his resignation, on account of ill-health, from the position of works director. He remains a director of the company. Mr. G. R. J. Hallam has been appointed a director and also works director, and Mr. C. E. Lowndes has been appointed works manager.

GEORGE ELLISON LTD., has announced that Mr. A. Ansell, manager of its Manchester and district branch office, has retired. Mr. B. L. Scott has been appointed manager of the Manchester branch office, and has been succeeded as manager of the Newcastle-upon-Tyne branch office by Mr. K. B. Oulton.

GEO. SALTER AND CO., LTD., announces that all products of the engineering divisions are now combined under one sales manager, Mr. G. Rushton. Mr. W. A. Whitehouse, has been appointed sales controller (engineering divisions), and a new representative, Mr. J. M. Hipkins, has been appointed to take over the Birmingham, Warwick and Oxford areas. Mr. Wm. M. Stewart has been appointed technical manager for engineering products for Scotland and the Border counties.

Business Announcements

THE INSTITUTION OF BRITISH AGRICULTURAL ENGINEERS has moved from 6, Buckingham Gate, to 6, Queen Square, London, W.C.1 (telephone Terminus 0140).

LACY-HULBERT AND CO., LTD., announces that 'BOREAS' vacuum pumps and air compressors manufactured in England, are to be marketed in Canada by the De Laval Co., Ltd.

WEST'S GAS IMPROVEMENT CO., LTD., states that the re-formation of the company has now been completed with the changing of the name of the original company to W.G.I. Ltd., its conversion into a non-trading holding company and the registration of two new subsidiary companies. The two subsidiaries are West's Gas Improvement Co., Ltd., and West's Works Ltd.

F. PERKINS LTD., announces that Mr. H. O. Hallas, M.I.Mech.E., Perkins Engines Ltd., zone manager for the Middle East and Africa, has left Britain for a 12,000 miles sales tour of Central and West Africa. He will also represent the interests of Perkins Outboard Motors Ltd., and Perkins Gas Turbines Ltd.

MR. R. W. WEEKES, M.I.C.E., managing director of the Harland Engineering Co., Ltd., is leaving for the Argentine in connection with the completion of a contract worth about £1,000,000, for the supply and erection of the complete mechanical and electrical equipment of four major pumping stations for the domestic water supply of the city of Buenos Aires.

Contract

BRITISH INSULATED CALLENDER'S CONSTRUCTION COMPANY, LTD., THE ENGLISH ELECTRIC COMPANY, LTD., and the METROPOLITAN-VICKERS ELECTRICAL COMPANY, LTD. have been awarded a contract by the Polish government agency, Elektrim, to supply electric locomotives and overhead line equipment to Poland. The contract, totalling approximately £2¾ million, is based on long-term credits and covers the supply of twenty Bo-Bo locomotives, overhead line equipment, and a licence to manufacture the same type of locomotive in Poland. This equipment is required for further electrification of the Polish railways at 3000V d.c. Delivery of locomotives will begin in February, 1961, and be completed twelve months later. Overhead line equipment deliveries will begin very soon.

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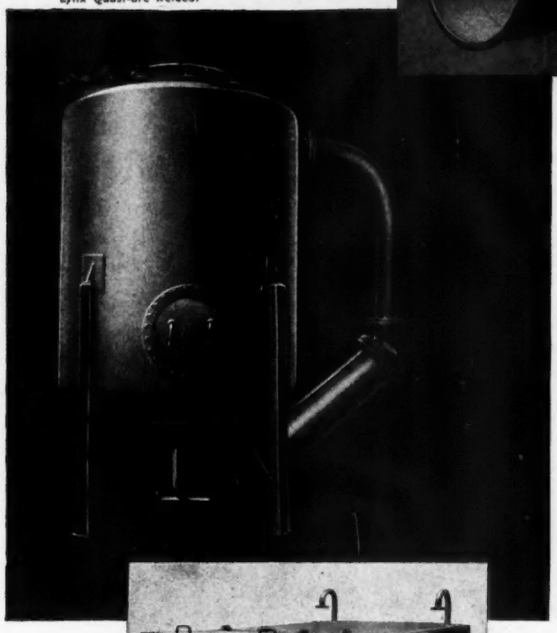
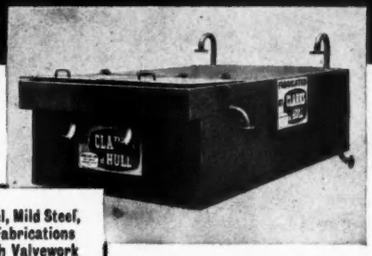
1,000 gall. kettle in ¼" copper. Lynx Quasi-arc welded.





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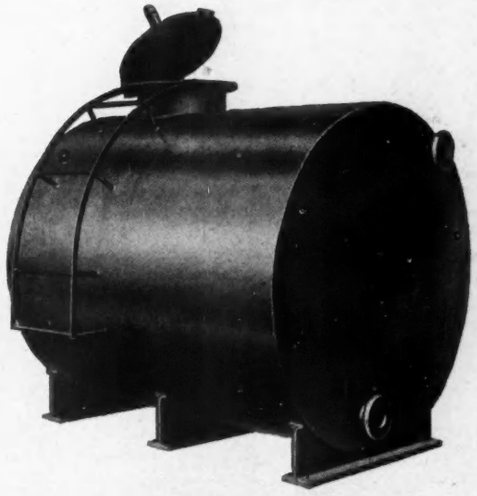

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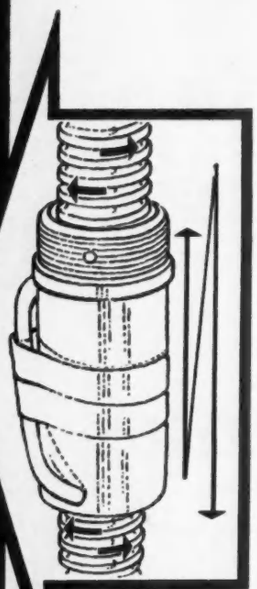

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SCRIVEN Geared 7-Roll Plate Straightening Machine, capacity 5/16in. thick, size of rollers 74in. long by 6½in. diameter, arranged motor drive 400/3/50; rollers arranged 5 on top and 4 on bottom, alternate fashion. Weight approx. 5 tons.

NEW BESCO 8ft. 4in. by 3/16in., Type HK, All-Steel Undercrank, Open-End Production Power Guillotine of steel construction, arranged motor drive, automatic hold-down, adjustable front and back guages.

SCHULER Power Geared, Open-Fronted, Inclinable, Cam-Action, Double-Action, Drawing Press, with adjustable bed; spring-balanced blankholder, with automatic ejector and vertical adjustment, punch stroke 11in. blankholder stroke 4½in., bed 24½in. by 14½in.

CRAIG and DONALD Model 400/10, All-Steel, Motorised, Double-Geared Press Brake of steel plate construction, pressure exerted 400 tons, forming capacity 10ft. by ⅜in., depth of gap 12in., width between side frames 82in., stroke 4in., maximum daylight, stroke down adjustment up, 18in., arranged motor drive 440/3/50, air-operated treadle clutch. Weight about 29 tons.

NEW STOELTING Pyramid Type Plate Bending Roller, motorised 400/440/3/50, capacity 10ft. wide by ⅜in. mild steel; diameter of rollers: top 9½in., bottom 7⅜in.; drop end bearing for removal of completed cylinders, support rollers to bottom rolls, reduction gearbox drive to bottom rolls with multi-disc slipping clutches, motorised adjusment to top roller.

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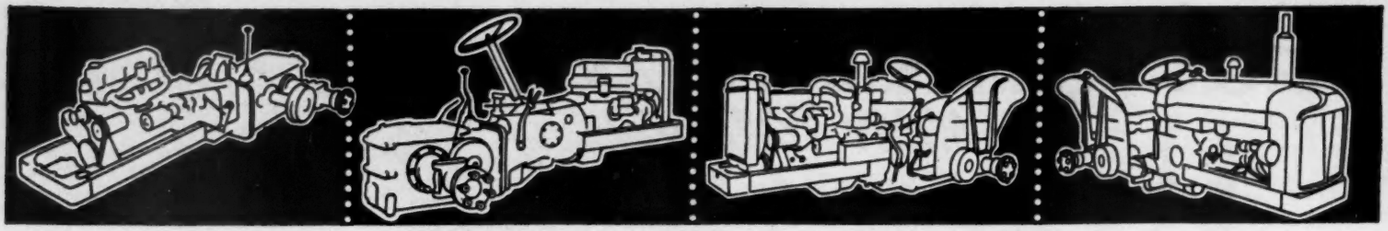

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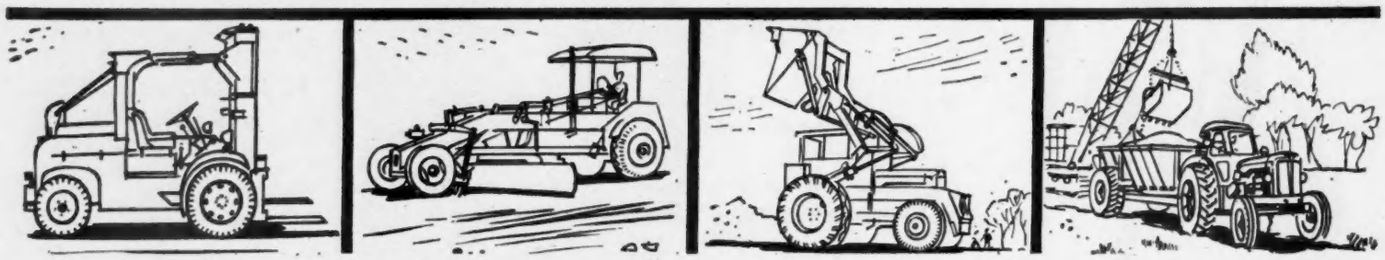

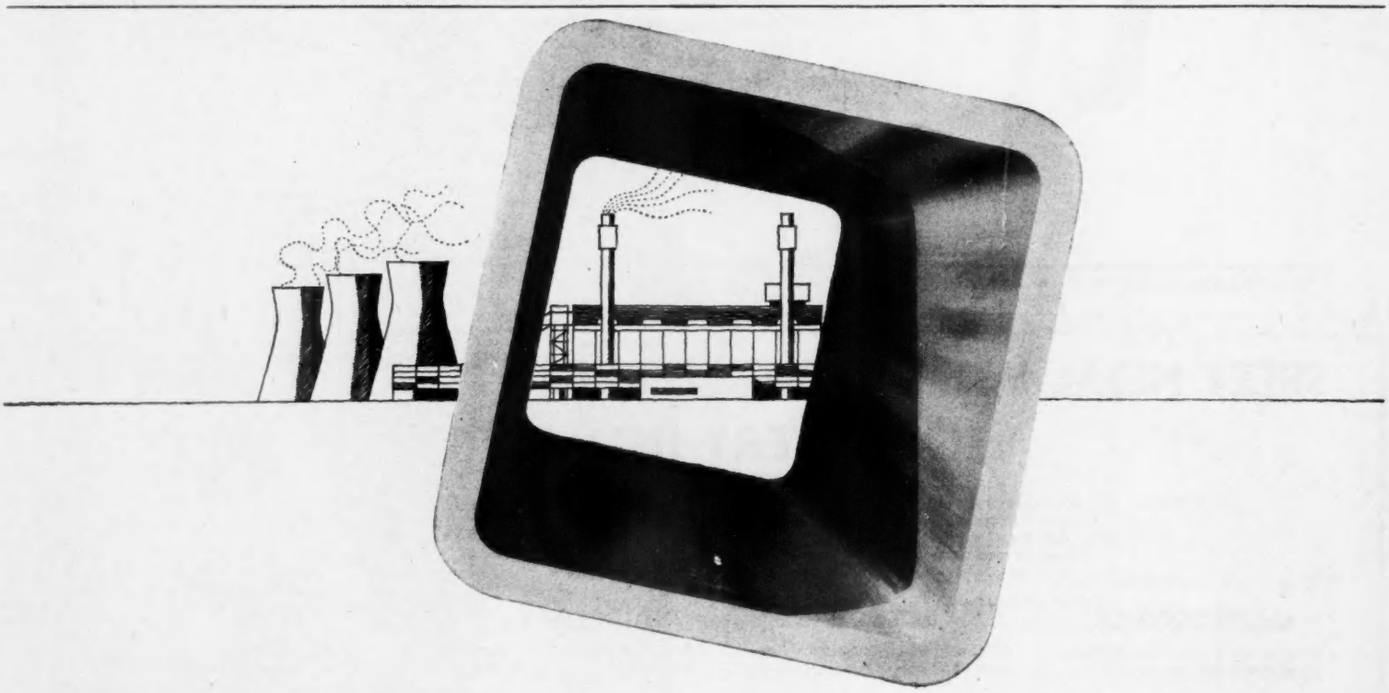

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